#### FINAL SUBMITTAL

ENERGY SURVEYS OF

ARMY INDUSTRIAL FACILITIES

ENERGY ENGINEERING ANALYSIS PROGRAM

LETTERKENNY ARMY DEPOT

CHAMBERSBURG, PENNSYLVANIA

**VOLUME IV** 

PROGRAMMING DOCUMENTS

CONTRACT NO. DACA65-91-C-0071

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS NORFOLK, VIRGINIA

DTIC QUALITY INSPECTED &

#### PREPARED BY:

ENERGY AND ENVIRONMENTAL SERVICES DEPARTMENT REYNOLDS, SMITH AND HILLS, INC.
P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201
904/279-2277

RS&H PROJECT NO. 2900379001

JANUARY 1992

Approved for public release;
Distribution Unlimited

TABLE OF CONTENTS

<u>Section</u>	<u>Project Type</u>	ECO#	Name
1	QRIP	1	Compressed Air Valve Replacement
2		6	Heat Recovery from Condensate
3		9	Paint Booth Exhaust Fan Controls
4		11	Blast Booth Fan Cut-Off
5		15	Modular Offices
6	OSD PIF	3	Dip Tank Covers with Exhaust Fan Controls
7		10	Drive-In Paint Booth Air Flow Controls

QRIP

POCI IMENTATION FOR PRODUCTIVITY CAPITAL	APITAL INVESTME	NVESTMENT PROGRAMS	1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL	ONTROL SYMBOL
For use of this form, see AR 6-4; the proponent	proponent agency is OCA.	CA.	AMC QRIP			t) 1661
-	a. THRU: US AMC	_	Commander		6. DOD COMF NAME Army	6. DOD COMP CODE A
tagon of 2020	th: AMCMM-N 01 Eisenhowe	Attn: AMCMM-M 5001 Eisenhower Ax303-0001	Attn: AMSDS- Chambersburg,	Attn: AMSDS-RM-P Chambersburg, PA 17201-4170	7. COMMAND CODE  1. W730KK	8. DATE 10/9/91
†		10. TYPE OF PROJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	IAMS/MONTHS	
Compressed Air Shut-Off Valves	es	ORIE ORIE		8,108	+ 4 <b>,</b> 004	
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR		13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cost)	(Average Annual Sarbigs)	Lerings) (Na. May)
024				- 2.0 or	(months)	(amortisation)
16. SUBMITTING UNIT(S) 16.	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Commander Letterkenny Army Depot Attn: SDSLE-EM (T. Hagie) Bldg. 663 Chambersburg, PA 17201-415D		Replace exis	Replace existing compressed gate-type shut-off valves with ball valve type.	d gate-type s	hut-off valves	with ball
18. DETAILED JUSTIFICATION						
Unlike gate valves, ball valves sh little access, on-off position is	lves shut ofi ion is easily	f quickly with y identified a	hut off quickly with a single motion through a 90° angle. easily identified and is less susceptible to leaking.	on through a ceptible to l		It requires
19. SAVINGS DISPOSITION						
Savings are used to reduce e	energy expen	expenditures				
				-		
20. OTHER REMARKS (Continue on page 6, If more space is needed)	100 to meeted)					

4				SUMMI (ROUND OF	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	/INGS DOLLAR)				•
1			Attach	ttach computation theet identifying the method and source of data for savings	ntifying the method an	d source of data for s	ryings			
ľ	SAVINGS	PRESENT		PROPOSED METHOD	<b>МЕТНОО</b>			DIFFERENCE/SAVINGS	SAVINGS	
•	BREAKOUT	METHOD	18T YR	2D YM	3D YA	4TH YR	1ST YR	20 YR	30 YR	4TH YR
ALA	ALARY/LABOR/									
AATE	INTERIAL/ UPPLIES									
E	TILITIE8									
AAINTE	IAINTENANCE/									
Ž	RANSPORTATION									
3	EASE COSTS									
TAP.	ALVAGE/ URN-IN									
ENE	Electricity	\$4,004	0\$	0\$	\$0	\$0	\$4,004	\$4,004	\$4,004	\$4,004
NO.	CONTRACT COSTS								·	
OTHE.	THER (Identify)									
	TOTALS	\$4,004	\$0	0\$	\$0	\$0	\$4,004	\$4,004	\$4,004	\$4,004
					PRIORITIZATION					
3	INTERNAL RAT Divide estimate	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost	8,108 by average	by average annual savings	4,004	2.0	factor.			
	Based on facto	Based on factor and number of years economic life	ars economic life of	of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	he IRR from Table !	4-3, App H, Ch. 5,	AR 6-4 -	.00 <b>% IRR.</b>	eć	
2	SAVINGS TO IN Multiply annua	Multiply annual sevings 4,004	un 04 X discount factor	9.524	38,134	_and divide by present value of investment	sent value of inv	•stm•nt		
	(Based on economic life.	somic life 25	1	" 4./0 8/1. years, select discount factor from Table H-4, App H, Ch. 5, AR 5-4	ile H-4, App H, Ch. 6	i, AR 5-4.				
(3)	RATE OF INVEI Divide estimate (Manpower req	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)  Divide estimated project cost  Manpower requivalents cannot be used in this computation.)	WER SPACE (RIMS)  by nu  used in this computer	MS) N/A by number of manpower space savings rputerion.)	space savings	-		RIMS.		

	COST SOB PROJECT TO RECOME OPERATIONAL	COME OPERATIONAL				,
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS
•	•	3	9	•		
w Compressed air ball valves		\$35.56	322	\$8,108		
(8)						
(3)	-					
(4)						
(8)						
(6) TRANSPORTATION (Equipment delbery)						
(1) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(B) MAINTENANCE CONTRACT <sup>2</sup>						
(10) FACILITIES MODIFICATIONS					·	
(11) TRAINING						
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OPERATION	E OPERATIONAL			\$8,108		
(14) TOTAL AMOUNT OF FUN	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			\$8,108		
(18) TOTAL AMOUNT OF FUNDING REQUI	IDING REQUIRED FROM OTHER SOURCE					
(16) TOTAL (8um of (14) + (16) abour)	() above)			\$8,108		
Not to exceed 10% of equipment cost for QRIP projects.	e and do not be and	as bill for the equipment and lattel maintenance.				

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

<sup>3</sup>Normally not OPA funded.

<sup>&</sup>lt;sup>4</sup>Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

ğ			S	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
			8A VINGS				REAPPLICATION OF SAVINGS	F SAVINGS		
	ITEM	NO. MPR OR MHR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
		•	ů		e. FROM	ر. TO	g. FROM	А. ТО	L FROM	, TO
3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
8	REQUIREMENTS ONLY ELIMINATED									
ઈ	BORROWED MILITARY MANPOWER RELEASED									
3	OVERHIRES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
9	MANHOURS SAVED FROM MULTIPLE POSITIONS	·								
3	OTHER DOLLAR SAVINGS (Excluding Mempower), e.g., CONTRACT COSTS & UTILITIES						·			
€	Electricity			\$4,004						
3										
(02)										
9.5	) TOTAL BOLLAR SAVINGS			\$4,004						
0	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO	Reflect specific duties be	c duites being per	hg performed with additional manhours available (equivaleni manyears)	nel menkours eveile l	ske (equivalent man)	çarıj			

C 1, AR 5-4

1 August 1982

The propert complex with public hars, GOD publican and regulations, and all other regulations at loos about the control of the contr			
refulations, and all other regulatory constraints.  ***A. Fee Eng. Log. Prin. etc.)  ***S. Fee Eng. Log. Prin. etc.)  ***SIGNATURE  ***SIGNATU			
with the Eng. Log. Par. 46c.)  The Eng. Log. Par. 46c.)  Signature  Signature  Signature  Signature  Signature  Signature  Signature	This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance w The project compiles with public laws, OSD policies and regulations, and all other regulatory constraints.	ccordance with established investment plans	ing.
internal Abency or Proket  SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE		•	
FOR USE BY HQDA ON OSD PLF PROJECTS ONLY BIGNATURE  BIGNATURE	(Cite regulatory approvals, e.g., TAGO Control No.) (Es. New Start, TAGO Approval, etc.)	ıl, otc.)	
SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE	h. OTHER COORDINATION (Punctional Coordination at local lavel, e.g., Pac Brg, Log. Para etc.)		
BIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE			
FOR USE BY HQDA ON OSD PIF PROJECTS ONLY SIGNATURE	mmand/Agency or Project	DATE (YYM)	(aa)
FOR USE BY HQDA ON OSD PIF PROJECTS ONLY  BIGNATURE		AUTOVON	
FOR USE BY HQDA ON OSD PIP PROJECTS ONLY SIGNATURE		DATE (YYM)	(aa)
FOR USE BY HQDA ON OSD PIF PROJECTS ONLY SIGNATURE		AUTOVON	
BIONATURE			
		DATE (YYM)	laai
GOTHER REMARKS (Cont'4)		AUTOVON	
	SO OTHER MEMARKE (Control)	-	

Page 6 of DA Form 5104-R

Figure H-1. Documentation for Productivity Capital Investment Program (DA Form 5108-R)—Continued.

#### ECO Number: 1

#### COMPRESSED AIR VALVE REPLACEMENT IN BUILDING 350

#### Discussion

Building 350 is constructed with a one-inch diameter compressed air supply on each of the 228 columns. Typically, these air stations are arranged with a shut-off gate valve followed by one or more quick disconnect compressed air hose fittings. The problem is that many of the air stations are leaking compressed air continuously.

All the leaks are in valve stem packings or hose connections downstream of the manual, gate-type, shut-off valve located on the column. Typically, these valves are left open all the time, allowing the compressed air to leak out. The background noise is too high to hear the leaks, and the workmen often wear gloves so they cannot feel them either. It is cumbersome to shut off a gate valve which requires multiple turns, particularly if access to it is blocked by surrounding equipment. A ball valve shuts off quickly (requiring on a single motion through 90° angle), requires little excess, and is less susceptible to leaking.

Based on the results of a leak survey (see Appendix B), it is estimated that about half of the 228 columns in Building 350, have a detectable leak. These leaks total 85 cfm and cost approximately \$4,000 annually.

#### Recommendations

It is recommended that the compressed air shut-off valve on each column in Building 350 be changed from the existing gate valve to a ball valve; and that this new valve be closed at all times when compressed air is not in use. Typically, this would be at the end of a workman's shift.

Construction Cost	\$7,271
Annual Energy Savings (MBtu/yr)	
Electricity	366
Annual Energy Cost Savings (\$/yr)	\$4,004
SIR	7.5
Simple Payback (years)	2.0

PR	ISTALLATION ROJECT NO.	<pre>&amp; LOCATION: &amp; TITLE: ECC</pre>	ST ANALYSIS SIN INVESTMENT INVESTMENT INVESTMENT INVESTMENT INVESTMENT IN THE PROPERTY OF T	ARRE SSED	GION NOS AIR VALV	. 3 CENSU E REPLACEM	IS: 1	01 .062
			CRETE PORTION L ECONOMIC L				Y: G.	FALLON
1.	B. SIOH C. DESIG D. SALVA	RUCTION COST IN COST IGE VALUE COS		C - 1	D)		\$ \$ -\$	7271. 400. 437. 0. 8108.
2.	ENERGY SA ANALYSIS	VINGS (+) / DATE ANNUAL	COST (-) . SAVINGS, UNI	IT CO	ST & DIS	COUNTED SA	VINGS	i
	FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANN SAV	UAL \$ INGS(3)	DISCOUNT FACTOR(4	DI ) SA	SCOUNTED VINGS(5)
	B. DIST C. RESID D. NAT G	\$ 10.94 \$ 7.43 \$ 6.61 \$ .00 \$ .00	0.	\$ \$ \$ \$	4004. 0. 0. 0.	15.11 21.31 25.22 20.70 15.93		60501. 0. 0. 0.
	F. TOTAL		366.	\$	4004.		\$	60501.
3.	NON ENERG	Y SAVINGS(+)	/ COST(-)					
		RECURRING (	+/-) OR (TABLE A)			14.53	\$	0.
	(2) D	ISCOUNTED SA	VING/COST (3A	X 3/		14.55	\$	0.
	C. TOTAL	NON ENERGY D	ISCOUNTED SAV	INGS	(+)/COST(	(-)(3A2+3B	d4)\$	0.
	(1) 2	5% MAX NON E A IF 3D1 IS B IF 3D1 IS C IF 3D1B IS	QUALIFICATION NERGY CALC (2 = OR > 3C GO < 3C CALC = > 1 GO TO < 1 PROJECT	F5 X TO I SIR =	.33) ITEM 4 = (2F5+3D 4 4	01)/1F)		
4.	FIRST YEAR	R DOLLAR SAV	INGS 2F3+3A+(	3B1D/	YYRS ECO	NOMIC LIF	E))\$	4004.
5.	TOTAL NET	DISCOUNTED	SAVINGS (2F5+	3C)			\$	60501.
6.		D SAVINGS RA PROJECT DOES	TIO NOT QUALIFY)		(R)=(5 /	1F)= 7	. 46	
7.	SIMPLE PA	YBACK PERIOD	(ESTIMATED)	SF	PB=1F/4	2	.02	

	<b>®</b>

SUBJECT LETTER KENNY A.D.	AEP NO 290-0379-001
ECO #1	SHEETOF
DESIGNER GIFALLON	DATE
CHECKER P. Hydchius	DATE

# ECO # 1 Compressed Air VALVE Replacement in Blog 350

EACH COLUMN CONTAINS AT LEAST ONE COMPRESSED AIR
ROOT VALUE. DRAWINGS SHOW 4 ROWS IF ST CULUMNS EACH;
total 228 COLUMNS => 228 ± pir stations. 40 Colis
HAO LEAKS.

COLUMNS SURVEYED

B19 +HRU B57 2ND CII Thru C57 =7 84 COL'S

PERCENT W/LEAKS

40 ×100 = 47,62%

ESTIMATED COL'S W/LEAKS

228 COL'S X . 4762 = 109 COL'S.

TOTAL ESTIMATED LEAKAGE

& LEAKS = 31 CFM

31CFM × 109 COL'S = 84.5 CFM.

TOTAL VALUE OF LEAKS

84.5 CFM x 60 m x 8760 H x 0.009 MBth

X 10.94 2 400 9/4 R

TOTAL ENERGY TAVED

4000 x mBTU = 346 MBTU/yR.

## RSH

Distribution:

# Telephone Call Confirmation (704) 529 - 2/04

				roject No <del>0</del>		
cai.	L.D	Placed_		Rec'd	Date	
	Gr. Fallon	Co	nversed With_	Tom Kno	ruland	
	Gr. Fallon Tugarsol-Rand		Regarding_	(oupressor	Fenergy U	se
	TK gave the	following	energy	use valu	<u> </u>	
	•				kwh/kcf	MBtu/ko
-	ATH	Rha	P31G	BruyCFM		
	CFW	Bhp				
				509 538		
		330		485		
	1603	306	(00	785	2.5 (	0.0000
	CALC ENERGY WOTOR EFF =		CFI	u of Air		
	WOTON EVI	0.70				
			·			

1-1a

1	

SUBJECT	LEAD ECOTI	AEP NO
		SHEETOF
DESIGNER	G. Fallen	DATE
	P Hodelin	DATE

COST	a.C	RALL	VALVE
C03 1	07	13/400	VACVE

FROM <u>MEANS</u>, ITEM 151-955-1470

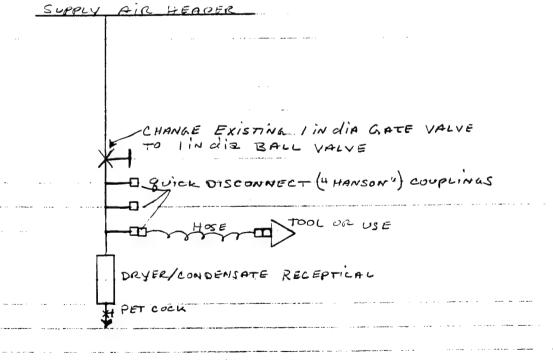
AND FROM CONSTRUCTION COST CALCULATION (ATTACHED)

228 VALVES = \$\frac{4}{8131}

PAYBACK

#8131 = 2.0 years

SKETCH



NOTE: EXISTING GATE VALVE OFTEN HAS LEAKY VALVE STEM AND ARE RARELY

CLOSED. THIS ALLOWS DOWNSTREAM LEAKS TO CONTINUE. VALVE IS

"DIFFICULT" TO SHUT OFF. BALL VALVE IS QUICK SHUT OFF TYPE. Therefore

MORE LIKELY TO BE SHUT OFF BY WORKERS WHEN ASKED TO: DO SO.

1-2

# ECO Construction Cost Estimate Calculations

ECO Name: Air Valves Replacement in Building 350

ECO #: 1

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$2,109 \$2,440
Subtotal bare costs FICA Insurance (20% of Labor) Sales Tax (6.5% of Material)	\$4,549 \$488 \$137
Subtotal Overhead (15%)	\$5,174 \$776
Subtotal Profit (10%)	\$5,950 \$595
Subtotal Bond (1%)	\$6,545 \$65
Subtotal Contingency (10%)	\$6,610 \$661
Subtotal (Construction Cost Input For LCCID *)	\$7,271
SIOH (5.5% of Construction Cost)	\$400
Subtotal Design (6% of Construction Cost)	\$7,671 \$436
Total Project Cost	\$8,107

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

	CONSTRUCTION COST	ESTIMA	TE		DATE PREPARE	0	SHEE	T OF
PROJECT				-	L	BASIS F	OR ESTIMATE	
LOCATION	ENERGY ENGINEERING	ANALYS	SIS				CODE A (No de	eign completed)
	Letterkenny A	Classif	Ken	-+		CODE 8 (Preliminary dealgn)		
ARCHITEC						1	CODE C (Final THER (Specify)	dealgn)
DRAWING N	REYNOLDS, SMITH AN	DHILLS		.P., I	NC.		CHECKED BY	
			ESTIN	G. 1	Fallon		CHECKED BY	
	ECO #1 SUMMARY	QUANT	ITY		LABOR		MATERIAL	
	SUMMARY SUMMARY	NO. UNITS	UNIT	1	TOTAL	PER	TOTAL	COST
lin Ø	BALL VALVE	228	EA	10.70	2440	9.25	2109	4549
					<del></del>	<del>                                     </del>		
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ENG FORM 150

\* U.S. GOVERNMENT PRINTING OFFICE . 1990 8-616148

#### LETTERKENNY ARMY DEPOT COMPRESSED AIR SURVEY BUILDING 350

COLUMN/	LEAK*		
	DETECTION	FLOW**	
ID			COMMENT
B26	A	0.659	VALVE PACKING (MEASURED)
B54	A	1	VALVE PACKING
C24	A	1.5	1 HOSE COUPLING
C28	A	1.5	DRYER DRAIN
C32	A	1.5	VALVE PACKING
C47	A	1	VALVE PACKING
PB60	A	4.1	DRYER DRAIN PAINT BOOTH 60 (MEASURED
B19	Ď	(0.5	VALVE PACKING (MEASURED)
B23	D	(0.5	VALVE PACKING
B27	D	⟨0.5	HOSE COUPLING
B30	D	⟨0.5	HOSE COUPLING
B31	D	⟨0.5	HOSE COUPLING
B35	D	⟨1.5	3 HOSE COUPLING
B36	D	⟨0.5	
B37	D	⟨0.5	1 HOSE COUPLING (BREATHABLE AIR)
B38	D	>0.5	1 HOSE COUPLING
B50	D		VALVE PACKING
C21	D	(0.5	1 HOSE COUPLING
C36	D	⟨0.5	1 HOSE COUPLING
C38	D	(0.5	VALVE PACKING (BREATHABLE AIR)
C39	D	(0.5	VALVE PACKING (BREATHABLE AIR)
C42	D		VALVE PACKING
C46	D	⟨0.5	1 HOSE COUPLING
C51	D	(0.5	1 HOSE COUPLING
C52	D	⟨0.5	1 HOSE COUPLING
C54	D	(0.5	1 HOSE COUPLING
C55	D	⟨0.5	DRAIN COCK
B39	F	1	1 HOSE COUPLING
B46	F	1	VALVE PACKING (MEASURED)
B48	F	1	VALVE PACKING
B51	F	1	VALVE PACKING
B55	F	1	DRAIN COCK
C11	F	<1	1 HOSE COUPLING
C13	F	<1	1 HOSE COUPLING
C14	F	1	DRYER DRAIN
C17	F	<1	1 HOSE COUPLING
C18	F	<1	1 HOSE COUPLING
C23	F	1	1 HOSE COUPLING
C25	F	1	1 HOSE COUPLING
C31	F	1	1 HOSE COUPLING
C45	F	_1	VALVE PACKING
		-	

<sup>\*</sup> A = AUDIBLE TO HUMAN EAR WITH "AT WORK" BACKGROUND NOISE

D = DETECTOR ONLY. LEAK COULD NOT BE HEARD OR FELT

F = CAN BE FELT WITH HAND

<sup>\*\*</sup> FLOW WAS MEASURED IN EACH OF THE MAJOR CATAGORIES (A,D,F). FLOW WAS ESTIMATED BASED ON CATAGORY OF DETECTION SENSITIVITY

SOCIEMENTATION FOR SECRECIVITY CAPITAL INVESTMENT PROGRAMS	Γ	1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL	ONTROL SYMBOL
For use of this form, see AR 5-4; the proponent spency is OCA.	OCA.	AMC QRIP		DD-M(R) 1661	1) 1561
J. THRU: US AMC Atth: F. A	MCMM-M		M−P	6. DOD 7. COM	6. DOD COMP CODE A B. DATE
og <u>r</u>	VA 22303-0001 Chamb	ersburg,	PA 1/201-41/0 W/3	M/3UKK	10/3/31
Condensate Heat Recovery	- June -	OSD PIF   PECIF	2,703	÷ 4,100	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER. ATIONAL DATE	1	(Average Annual Serbegy)	1
024	25		(years)	(months)	(amortization)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Commander Letterkenny Army Depot	Recover hear	Recover heat from dip tanks condensate which is otherwise as industrial waste water.	s condensate	which is other	wise disposed
Attn: SDSLE-EM (T. Hagie) Bldg. 663 Chambersburg, PA 17201-415D					
RECAUSE dip tanks contain chemicals that project recovers the heat from the waste	at are harmful to boiler te condensate to be used		water, condensate is to heat the building	is not returned. ng interior.	ed. This
1					
Savings are used to reduce energy expe	expenditures				
20. OTHER REMARKS (Continue on page 5, If more space is needed)					

1				SUMM.	SUMMARY OF BOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	VINGS DOLLAR)				
		,	Attac	tech computation sheet identifying the method and source of data for savings	entifying the method at	nd source of data for s	svings	DIFFFRENCE/SAVINGS	SAVINGS	
				PROPOSED METHOD	МЕТНОВ			Olytenement	8× 00	ATH YR
* 5	BREAKOUT	METHOD	1ST YR	2D YR	30 YR	ATH YR	181 VR	20 YR	2	
ALARY/U	ALARY/LABOR/									
AATERIAL/ JUPPLIES	NAU E8									
TILITIES	931.									
AAINTE	AAINTENANCE/									
A E	RANGPORTATION									
EVE	EASE COSTS									
BALVAGE/ TURN-IN	AGE/							·		
#9#	#6 Fuel 011	33,800	29,700	29,700	29,700	29,700	4,100	4,100	4,100	4,100
<b>20M</b>	CONTRACT COSTS									
OTHE	OTHER (Identity)		Υ,							
	TOTALS	33,800	29,700	29,700	29,700	29,700	4,100	4,100	4,100	4,100
48	INTERNAL PA	INTERNAL RATE OF RETURN (IRR)			A 100	0 66	factor.			
	Divide estimat Based on facts	Divide satimated project cost	onomic lif	e of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	the IRR from Table	. H-3, App H, Ch. 5	AR 6-4 -	300 s irr.	RR.	
(2)	SAVINGS TO II	BAVINGS TO INVESTMENT RATIO (8/1)	(1/9)							
	Multiply annual savings	1) 2.703		X discount factor 9,524 = 39,000 and divident, as a select discount factor from Table H-4, App H, Ch. 5, AR 5-4.	- 39,00	39,000 and divide by present value of investment pp H, Ch. 5, AR 5-4.	reent value of in	<b>vet</b> ment		
2	RATE OF INV	RATE OF INVESTMENT PER MANPOWER SPACE (RII	OWER SPACE (RIMS)	N/A		•		RDM8.		
	Divide estims (Manpower ra	Divide setimated project cost (Manpower requivalents cannot be used in this com	e used in this compu	by number of manpower space extraction.)						

	COST FOR SECIECT TO RECOME OPERATIONAL	OME OPERATIONAL				,
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS
•	•	s	9		,	,
" Hydronic heaters	1	\$901	3	\$2,703		
(11)						
(8)						
(P)						
(9)						
(6) TRANSPORTATION (Equipment delivery)	E I I I I I I I I I I I I I I I I I I I					
(7) EQUIPMENT MODIFICATION						
(9) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT <sup>2</sup>			ŕ	,		
(10) FACILITIES MODIFICATION <sup>3</sup>						
(11) TRAINING			<i>ii</i>			
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	COME OPERATIONAL			\$2,703		
(14) TOTAL AMOUNT OF FUNDING REQUES	FUNDING REQUESTED IN THIS PROPOSAL			\$2,703		
(15) TOTAL AMOUNT OF FUNDING REQUIR	FUNDING REQUIRED FROM OTHER SOURCE			1		
(16) TOTAL (8um of (14) + (16) above)	+ (16) above)			\$2,703		

Inc. to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged dost involving one bill for the equipment and initial maintenance.

<sup>3</sup> Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include cortification that funds are evallable, if financed from the regular budget:

ä			S	UMMARY OF SAVI	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
			SAVINGS				REAFFLICATION OF SAVINGS	SAVINGS		
	300	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	LEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
·	•	•	·	•	e. FROM	, TO	F. FROM	A. TO	L FROM	у. то
3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
ê	REQUIREMENTS ONLY ELIMINATED									
9	BORROWED MILITARY MANPOWER RELEASED									
3	OVERHIRES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
ê	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
3	OTHER DOLLAR SAVINGS (Excluding Margower), e.g., CONTRACT COSTS & UTILITIES							er de		
9	#6 Fuel Oil			\$4,100						
ē										
(01)										
an	TOTAL DOLLAR SAVINGS			\$4,100						
	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specific duties be	c duites being po	rformed with addition	big performed with additional manhows available (equinalen) manyears)	bk (equivakni man	yeara		-	

C 1, AR 5-4

PEGULATORY APPROVAL/COORDINATION	VAL/COORDINATION	
INVESTMENT STATEMENT	STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	facilities. This investment is in accordance with established inversy constraints.	ment plenning.
	•	
(Cite regulatory seprovals, e.g., TAGO Control	fulsions approved, e.g., TAGO Control Na.) (Es. New Start, TAGO Approved, etc.)	
h. OTHER COORDINATION (Functional Coordination of local level, e.g., Fac Eng, Log, Pera etc.)		
25. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project initialar)	SIGNATURE	OATE (YYMMDD)
		AUTOVON
26. APPROVAL RECOMMENDED BY (MACOM/Apricy)	SIGNATURE	DATE (YYMMDD)
		AUTOVON
FOR USE BY HQDA ON OSD PIP PROJECTS ONLY		
	TO LANGE	DATE (YYMNDD)
		AUTOVON
20. OTHER REMARKS (Cont.d.)		

Page 6 of DA Form 5108-R

#### ECO Number: 6

#### CONDENSATE HEAT RECOVERY FOR BOILERS IN BUILDING 349

#### **Discussion**

This ECO identifies known steam and condensate losses, assesses their recoverability and evaluates their economic impact.

Steam losses for deaerator heating, atomizing steam, soot blowing and steam cleaning are all vented directly or indirectly to the atmosphere. Condensate losses from dip tank heating may be contaminated by chemicals used in various processes and water losses from boiler blowdown are "dirty" and unsuitable for return. One energy savings option is to recover the heat from the various streams.

The heat in the boiler blowdown can be recovered for boiler makeup. The heat in the dip tank condensate can be used to heat building air during the heating season. Both of these options are evaluated in this ECO.

#### Recommendations

Based on the Life Cycle Cost Analysis, heat recovery from the boiler blowdown is not recommended. However, heat recovery from dip tank condensate in Buildings 350N, 350S and 370 are recommended.

Construction Cost	\$2,423
Annual Energy Savings (MBtu/yr)	
No. 6 Fuel Oil	938
Annual Energy Cost Savings (\$/yr)	\$4,100
SIR	38.6
Simple Payback (years)	0.7

LIFE CYCLE COST ANALYSIS SUMMARY  ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) INSTALLATION & LOCATION: LETTERKENNY ADREGION NOS. 3 CENS PROJECT NO. & TITLE: ECO #6 HEAT RECOVERY FROM CONDENSAT FISCAL YEAR 1992 DISCRETE PORTION NAME: TOTAL PROJECT ANALYSIS DATE: 10-14-91 ECONOMIC LIFE 25 YEARS PREPARED	US:	1	
1. INVESTMENT A. CONSTRUCTION COST B. SIOH C. DESIGN COST D. SALVAGE VALUE COST E. TOTAL INVESTMENT (1A + 1B + 1C - 1D)		\$ \$ \$ \$	2423. 134. 146. 0. 2703.
2. ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED S	AVIN	NGS	
FUEL \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(	4)	SAV	
A. ELECT \$ 10.94	1 1 2 0 3		0. 0. 104325. 0.
F. TOTAL 938. \$ 4137.		\$	104325.
3. NON ENERGY SAVINGS(+) / COST(-)			
A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) (2) DISCOUNTED SAVING/COST (3A X 3A1)	3	s s	0. 0.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3	Bd4)	\$	0.
D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% MAX NON ENERGY CALC (2F5 X .33) \$ 34  A IF 3D1 IS = OR > 3C GO TO ITEM 4  B IF 3D1 IS < 3C CALC SIR = (2F5+3D1)/1F)  C IF 3D1B IS = > 1 GO TO ITEM 4  D IF 3D1B IS < 1 PROJECT DOES NOT QUALIFY			
4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1D/(YRS ECONOMIC LI	E))	\$	4137.
5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C)	;	\$	104325.
6. DISCOUNTED SAVINGS RATIO (SIR)=(5 / 1F)= 38 (IF < 1 PROJECT DOES NOT QUALIFY)	3.60		
7. SIMPLE PAYBACK PERIOD (ESTIMATED) SPB=1F/4	.65		

RSH.

SUBJECT LETTERKENNU A.D.	AEP NO 25	40-0379-001
ECO #6	SHEET	OF
DESIGNER 6. F.	DATE	
CHECKER	DATE	

ECO#6 - REDUCE MAKEUP WATER REQUIREMENT AT BLOG. 349

PROCESS FLOW DIA	GRAM - MIN	BOILER (#349)	
D.B.	BLO6	BIDG 351	BLDG 7 370
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BLDG. 349	CR - CONDE	NSATE RECEIVE	<u> </u>
and the second s	DA - DEAER	ATING FEEDWATE	R HEATER
	DT - Dip	TANK HEATING	As to plan Engine Man Room or install somewhile the abilities on the control of
	H - Comp	ORT HEATING	
	L - Los		num ni
a light company of an expense of a service of the contract of	SC - STE	am CLEANING	Access and a second of the second

STE	EAM LOSSES	HEAT RECOVERABLE	CONDENSATE RECOVERABLE
1. 1	D. A. VENIT	No	NO
١. ر	CONTINUOUS BLOWDOWN	yes	N.O
3, 1	BOTTOM BLOW DOWN	YES	N O
4.	SOOT BLOWER	No	NO.
ر ح	ATOM. STEAM	No	NO
6. E	BLPG 350 DIPTANUS	YES	
	BLDG BUT STEAM ! LE	en NO	NO
9.	BLDG 370 DIP TANUS	yes	NO
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Committee management and	The second state of the se		
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			The second secon
*** ***	, a year sale, a large sale of members are the whole		
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		LETTER KENN	v A.D.	AEP NO	
	SUBJECT _	E(O #	4	SHEET	OF
DCI				DATE	
KSH.					
HEAT RECOVERY	CHECKER _	RIOND	OUNT (TJO	253)	
HEAT RECOVERY	HROW BO	LER BLOWL	owh Care	M 3 7	
DETERMINE B	LOW DOWN	FLOUS	and the second s	/	
DETERMINE B ASSUME: 3	000 ppm	TOS BOI	LER WATE	er (ABMA	STO)
a a a agus a an de nom a a a agus a an de de nom a an a	30 ppm	IN FEE	OWATER	and the state of t	
	V, V	STEAM	and the second of the second o	man and a second second	
		oppm		الماسية الموادية المناجات الماسية المناطقة المناط	
FEED WATER	BOILER	The second secon		an est anno e salada, alla figura e se a distribuir e sanguna an est e e se a se	است و المراود و الموسودين
FEED WATER PPM		en apparen aleure s <u>ammandariye mbalen aramel abbilaye</u> s.h. Samite da Mayada ( ) qay serreseren sami			
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	No. of No. of Street, No. of No.	water to the second			
		TER - STEAM			
ZSOLIPS = 0	= FEEDWAT	PR X CONCI - ST	EAM FLOW X CON	c Browdo	IWNX CONC
	= m+x C+	-mscs - m	a <sup>2</sup> B		
, is playing agricultural rapid recovery them are the described in delicity of P.A., destrict the	na tan salah s	managa managa paga paga paga paga paga paga paga	Annes est est est est est est est est est e		
	) = mf Cf -	(mf - mg) cs	- ma-CB		and the second s
	, = mcc <sub>f</sub>	- mBCB	e constantes - una altra differential autorità and incorredat de l'altra differential de l'		aan aan aan ah
n	nB = mf CI	$\frac{1}{8} = n + \frac{3}{3}$	000 - 00	l_mf	
So BLOC	udown &	.1% of	STEAM EL	<b></b>	
			and a sign for any or in a common contemporary to providing the administration of the contemporary contemporary and the contemporary co	to the second se	
10TAL S	TEAM P	CODDCY (ON	dender in diese et von <del>Vange</del> ner <i>militarier</i> en, ere die verliering, <i>militarie</i> e, verseer v	Committee of the Commit	
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TOVA	IL STEAM	PRODUCTION	- BoiLER Ef	ex st	page at an air many many many to the extension of
net org. Washington, collections on the edge-physical distributions committee	188578	MBTUL/4r			
in the property of the second contract of the	_	18911-(.8x148+	(1x28)	was an and the second of the s	
		(**************************************	, ,		
	= 221,5	million LBS	STEAM /4	<i>c</i>	
TOVAL	3 con Down	<u>, 1</u>			
The state of the s	<b>6</b> 1		3	- / -	And the second second second second second second
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RECOVERABLE	ENERGY IN	1 BLOW 1	Nwas	to the second se	
AssumE : 1	O AT COLD A	END APPO	ROAC H	-	to a character may be a second
9	opsig Boiler	PRESS	J& E	and the second section of the s	
	MAKE-UP WAT	ER TEM	> = 60°F	and the second section of the second	gant care trap dance and that the trap of
GOPTIG SAT WY	TER		a dispusable and the second of the second	The state of the s	
331%				annakaran baru sapakan Alaban sarah sanah salah sayan sayan sayan saka darah darah darah darah sayan sayan say	
4		GO'F	maka mining alamanan mining sa kaling ang panggan ang panggan ang panggan ang panggan ang panggan ang panggan a	To the second se	
		o waste	and agree transmission, size. An experience is a stronger color, for the first in the	AL	

Q = WCPAT =	221,5 X103 LBS/4r X (	331-70) = 12.3 MBTY
	0.3×10°	#6010

VALUE OF RECOVERED ENERGY

72.3 MBTU /yr x 6.61 /mBTU = 478. /yc.

Construction 200 = #9297

PAYZACK = 1914 YEARS => NOT RECOMMENDED

4-3

7 1	Co	
	O.	

SUBJECT	LEAD	AEP NO	
	Eco #6	SHEET	OF
DESIGNER		DATE	
		DATE	

## HEAT RECOVERY FROM DIP TANK CONDENSATE.

#### DIP TANK STEAM CONSUMPTION

DURING NON-WORK SUMMERTIME WEEKENDS THE ONLY
STEAM CONSUMERS ARE THE DIP TANKS IN BUILDINGS
350 & 370. SINCE THESE ARE THE ONLY CONSUMERS
AND THE COMOENSATE IS DUMPED, THE MAKEUP FLOW
IS EQUAL TO THE STEAM FLOW AND THE
CONDENSATE FLOW.

#### 1990 AUGUST WEEK END MAKEUD FLOW DATA

DATE	MAK-UP FLOW (9PD)	
. 4	2891	
	2800	
	2800	***
12	2800	
18	3200	•
19	3300	
25	4000	
26	3300	
TOTAL	25100	
AVERAGE (GPD)	3140	
AVERAGE (#/42)	1090	The second part of the second of the second of

THERE ARE II HEATED TANKS TOTALING 17,200 P. L.

THE TANKS DERATE AT APPROX MATELY THE SAME

TEMPERATURE. THE STEAM CAN BE ASSUMED TO

BE CONSUMMED AS A FUNCTION OF TANK CAPACITY.

THE CONDENSATE TEMPERATURE IS EQUAL TO

THE TANK TEMPERATURE

	4/H		= ;	<b>O</b> .	0	568	· · ·	++ 5	TEA	m	IHR Igal	anguning were the statements of
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14	X	9	H

SUBJECT LEAD	·	AEP NO		
ECO #	6	SHEET	OF	
DESIGNER		DATE	•	
CHECKER		DATE		

### 350 N

## TOTAL STEAM CONSUMPTION

13,000 gal X 0.0568 # STEAM HR/gal = 738 LBS STM/HR.

RECOVERABLE ENERGY IN CONDENSATE

ASSUME: 68° F INDOOR TEMP, 10° H/X APPROACH.

738 LBS. STM /HR X (180-78) = 75,300 BTW/HR

ANNUAL HEAT RECOVERY

75 300 BTU/AR × 6687 HR/gR = 629 MBTU/GR OIL

RSH	•
	,

SUBJECT	LEAD	AEP NO		
	ECO#6	SHEET	OF	
DESIGNER		DATE	F	• .
CHECKER		DATE		

350 5

2 TANKS @ 1600 gal @ = 3200 gal

TOTAL STEAM CONSUMPTION

3200 gal x 0.0568 #STM/HR/gal = 182 L85 STM/HR

RECOVERABLE ENERGY IN CONDENSATE

182 LBS STM/HR X (180-78) = 18500 BTW/HR

ANNUAL HEAT SAVED

18500 BTW/HR X 6687 HRS/4R = 155 MBTW/YR #60il

Co	H

SUBJECT	LEAD	AEP NO	
	Eco#6	SHEET	OF
DESIGNER		DATE	
CHECKER		DATE	

370

3 TANKS @ 1000 gol@ = 3000 gol

TOTAL STEAM CONSUMPTION

3000 pdx 0,0568 #5/HRigel = 170 LBS STM/HR

RECOVERABLE ENERLY IN CONDENSATE

170 LBS STM/HR X (180-72) = 18400 BTW/HR

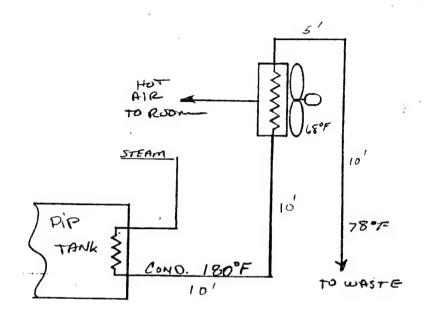
ANNUAL ENERLY RELOVERY

18400 8tul HR X 6687 HRS/ = 154 MBTU #601

# RSH.

SUBJECT	LEAD *		AEP NO		
C	Eco#6		SHEET	OF	
DESIGNER		Section 1	DATE		
CHECKER			DATE		

### DIP TANK CONDENSATE HEAT RECOVERY



1 HYDRONIC HEATER.

35 ft-/ "& SCH 40 pire.

3 1" & ... ELS.

NO INSULATION!

ONE UNIT REQUIRED @

EACH GROUP OF DIP TANKS,

3 TOTAL.

TOTAL ENERGY SAYED=, LZ9 + 155 +154 = 938 MBTU/YR

TOTAL CONSTRUCTION COST \$2701

## QRIP Calculations

Present energy use = \( (738 + 182 + 170) #/hr\} \( \) 6687 hr/yr \( \) 1050 8tm = \( \) 7653 MBtn/yr \( \) 4.41 \( \)/MBtn = \( \) 33,800/yr

#### LETTERKENNY ARMY DEPOT ENERGY AUDIT OF INDUSTRIAL FACILITIES

Operation Hrs/Day = 24

Room or Supply A. Air Quantity (cf	ir Conditions - Winter B)			68 1
Hour Fractions	1 AH - 9 AH 9 AH - 5 PH 5 PH - 1 AH			1 1 1
Operation Days Po	er Week			5
Taan	House of Occurrence	Total	Dolta	

		Temp. Hours of Occurrence		nce	Total	Delta	Delta			Total	
	Range		2-9	10-17	18-1	Hours	H or T	Const.	CFM	BTU/HR	BTU
	70	74	247	237	301	785	-4	1.08	1	0	0
	65	69	296	217	278	791	1	1.08	1	1	854
	60	64	269	196	236	701	6	1.08	1	6	4,542
	55	59	249	191	209	649	11	1.08	1	12	7,710
	50	54	221	193	202	616	16	1.08	1	17	10,644
	45	49	218	193	206	617	21	1.08	1	23	13,994
	40	44	237	236	239	712	26	1.08	1	28	19,993
	35	39	289	246	286	821	31	1.08	1	33	27,487
	30	-34	304	194	258	756	36	1.09	1	39	29,393
	25	29	184	106	152	442	41	1.08	1	44	19,572
	20	24	124	65	90	279	46	1.08	1	50	13,861
	15	19	75	32	57	164	51	1.08	1	55	9,033
	10	14	54	13	26	93	56	1.08	Ī	60	5,625
	5	9	18	3	9	30	61	1.08	1	66	1,976
	0	4	9	ō	2	11	66	1.08	1	71	784
	-5	-1	3	Ö	1	4	71	1.08	1	77	307
	-10	-6	1	ŏ	ò	1	76	1.08	1	82	82
	-15	-11	Ö	ō	0	0	81	1.08	1	87	0
 Tota	15		2798	2122	2552	7472					165,858

Total Operation Hours While Heating
(and corrected for working days/week) 4776 118,470

Avg outdoor teap while heating (F) 45.0

7472 - 785 4687 HRS OF HEATING

4-9

# ECO Construction Cost Estimate Calculations

ECO Name: Condensate heat recovery - dip tank heat exchanger

ECO #: 6

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$1,310 \$274
Subtotal bare costs	\$1,584
FICA Insurance (20% of Labor)	\$55
Sales Tax (6.5% of Material)	\$85
Subtotal	\$1,724
Overhead (15%)	\$259
Subtotal	\$1,983
Profit (10%)	\$198
Subtotal	\$2,181
Bond (1%)	\$22
Subtotal Contingency (10%)	\$2,203 \$220
Subtotal (Construction Cost Input For LCCID *)	\$2,423
SIOH (5.5% of Construction Cost)	\$133
Subtotal	\$2,556
Design (6% of Construction Cost)	\$145
Total Project Cost	\$2,701

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

CONSTRUCTION COST ESTIMATE				DATE PREPARE	0	51	EET	0.5
PROJECT	L	BASIS F	OR ESTIMATE	1				
LOCATION	ENERGY ENGINEERING ANALYSIS							
ARCHITECT ENGINEER						00E 8 (Prolin		
REYNOLDS, SMITH AND		THER (Specifi						
DRAWING NO.		ESTIM	ATOR	Fallon		CHECKED	Futh	. = 0
DIP TANK COND	QUANT	ITY		LABOR		MATERIAL	inen	MS
HEAT RECOV. ECO #6	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL		TOTAL COST
I HYDRONIC HEAVER					-			
MEANS No. 1556304000	3	EA	3/	93	415	125	0	1240
	35	LF			1.49			1340
1" SCH 40 DIRE 1" 11 11 ELS	3	EA	15.65	134 47	1.30	5	4	186
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\* U.S. COVERNMENT PRINTING OFFICE . 1905 0-0004

(TRANSLUCENT)

# ECO Construction Cost Estimate Calculations

ECO Name: Condensate heat recovery - blow down heat exchanger

ECO #: 6

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$3,340 \$1,980
Subtotal bare costs FICA Insurance (20% of Labor) Sales Tax (6.5% of Material)	\$5,320 \$396 \$217
Subtotal Overhead (15%)	\$5,933 \$890
Subtotal Profit (10%)	\$6,823 \$682
Subtotal Bond (1%)	\$7,505 \$75
Subtotal Contingency (10%)	\$7,580 \$758
Subtotal (Construction Cost Input For LCCID *)	\$8,338
SIOH (5.5% of Construction Cost)	\$459
Subtotal Design (6% of Construction Cost)	\$8,797 \$500
Total Project Cost	\$9,297

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

CONSTRUCTION COST ESTIMATE				DATE PREPARED			SHEET	or	
ENERGY ENGINEERING ANALYSIS					BASIS FOR ESTIMATE				
LOCATION					CODE A (No design completed)  (D) CODE B (Proliminary design)				
ARCHITECT ENGINEER						CODE C (Final dealgn)			
REYNOLDS, SMITH AND HILLS A.E.P., INC.									
DRAWING NO. ESTIMATOR				Fallon			P. Hutchin >		
BLOW DOWN HEAT	QUANT	ITY		LABOR		MATERIA			
KECOVERY - ECO 6	NO. UNITS	UNIT	UNIT	TOTAL	PER	701	PAL	COST	
BLOW DOWN HEAT HX									
MEANS ITEM NO									
155601180	1	ea	185	185	2160	210	0 0	2350	
2" & SCH 40 PIPE	200	LF	5.75	1150	2.91	59	32	1730	
2" & CAL. SIL FASULATION	200	LF	2.22	444	2.22	4	44	890	
Q" & STEEL ELS.	10	EA	20	200	15.7	1:	57	360.	
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PREVIOUS EDITION MAY BE LIKE

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(TRANSLUCENT)

DOCIMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS		1. PROJECT NO.		REQUIREMENT C	REQUIREMENT CONTROL SYMBOL
For use of this form, see AR 6-4; the proponent agency is OCA.	OCA.	AMC QRIP		)M-GG	DD-M(R) 1561
TO: HO DA IIS AMC	4	FROM: Commander		6. DOD COMP NAME Army	6. DOD COMP CODE
th: DACS-DME	Eisenhower Ayana-non1	Attn: AMSDS- Chambersburg.	Attn: AMSDS-RM-P Chambersburg, PA 17201-4170	7. COMMAND CODE  W730KK	8. DATE 10/9/91
0310-20/0   Alexand la-	15		11. AMORTIZATION YEARS/MONTHS	M8/MC	
Paint Booth Exhaust Fan Controls	Jane X	OSD PIF PECIF	5,135	÷ \$23,000	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE 14	14. EXPECTED OPEN. ATIONAL DATE	(Project Cost)	(Average Annual Sarbigu	Serbery (Na May
024	15		- 0.2 (years)	(months)	(amortisation)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION	2			
Commander Letterkenny Army Depot	This project provides allow exhaust air use		controls for nine paint booths that will only when occupied.	paint booths 1.	that will
Attn: SDSLE-EM (1. Hagle) Bldg. 663 Chambersburg, PA 17201-415)				٠	
convenience, paint booth exhaust		ontinuously d	left on continuously during work shifts.	This	project shuts
off the exhaust tan when unoccupled and	and saves energy.				
18, SAVINGS DISPOSITION					
Savings are used to reduce energy exper	expenditures				
20. OTHER REMARKS (Confined on page 8, if more space is notable)					,

\$				(ROUND O	(ROUND OFF TO THE NEAREST DOLLAR)	r DOLLAR)				
748			Attach	t computation sheet in	tach computation theet identifying the method and source of data for takings	ind source of data for	a a luga	DIFFERENCE/SAVINGS	/SAVING8	
446	SAVINGS	PRESENT	18T YM	2D VR 3D	3D VR	4TH YR	1ST YR	20 VR	30 VA	4TH YR
ALARY/LABOR/	LABOR/									
MATERIAL/	j									
JILITIE8										
MAINTENANCE/	ANCE/									
FRANSPC	FRANSPORTATION									
LEASE COSTS	8 E S									
SALVAGE/ TURN-IN	E									
E Lec.	Elec. 8 #6	45,800	24,200	24,200	24,200	24,200	21,600	21,600	21,600	21,600
EURTHA	EURTRACT COSTS								·	
OTHER (Identity)	(dentify)									
2	TOTALS	45.800	24,200	24,200	24,200	24,200	21,600	21,600	21,600	21,600
4		220			PRIORITIZATION					
E	TERNAL RAI	INTERNAL NATE OF NETURN (IRR)  5,135  Divide setimated project cost  5,135  by an Based on factor and number of years economic life	by a	_by average annual savings _ nic life of the project, select	rerage annual savings 23,000 0.2 factor. of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	0.2 H-3, App H, Ch. 6		300+ * IRR.	42	
(2)	BAVINGS TO INVESTMENT	SAVINGS TO INVESTMENT RATIO (8/1)		7.98	\$183,500	00 and divide by p	and divide by present value of investment	vestment		
	(undiscounted) 5.1	y 5,135	years, select	5.6 B/l. count factor from Tr	33. 6 B/l. discount factor from Table H-4, App H, Ch. 5, AR 5-4.	. 6, AR 6-4.				
(3)	ATE OF INVE	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	WER SPACE (RIMS)	N/A				RDM8.		
п с	Nyide setimal Kanpower re	Divide estimated project cost	Divide setimated project cost by number [Manpower requirelents cannot be used in this computation.]	by number of manpower space savings, putation.)	er space savings					

- I value	COST EOD PROJECT TO RECOME OPERATIONAL	ME OPERATIONAL				1
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY DR PROGRAM ELEMENT	FY FUNDS
•		o	P	•	,	-
u) Occupancy Sensor		\$571	6	\$5,135		
(2)						
(6)						
(9)						
(9)						
(6) TRANSPORTATION (Equipment delbery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT <sup>2</sup>			•			
(10) FACILITIES MODIFICATION <sup>3</sup>						
(11) TRAINING			2			
(12) OTHER (Specify):					·	
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	DME OPERATIONAL			\$5,135		
(14) TOTAL AMOUNT OF FUNDING REQUES	UNDING REQUESTED IN THIS PROPOSAL			\$5,135		1, 14 
(16) TOTAL AMOUNT OF FUNDING REQUIR	UNDING REQUIRED FROM OTHER SOURCE			1		
(16) TOTAL (8um of (14) + (15) about)	(15) above)			\$5,135		

INot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

<sup>3</sup>Normally not OPA funded

Specify source to include certification that funds are available, if financed from the regular budget: Used to compute amortization in Item 11.

ផ				SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	INGS (MANPOWER	AND DOLLARS				
			SAVINGS				REAPPLICATION OF SAVINGS	F SAVINGS		
	TEMB	NO. MPR OR MHR	TVPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA	TDA PARA AND LINE	FUNCTION CODE	N CODE
	•	•	J	,	e. FROM	/. TO	FROM	A. TO	L FROM	, 10
3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED								į	
3	REQUIREMENTS ONLY ELIMINATED									
રે	BORROWED MILITARY MANPOWER RELEASED									
3	OVERHIRES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
€	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
ê	OTHER DOLLAR SAVINGS (Excluding Mempower), 4.6. CONTRACT COSTS & UTILITIES									
9	Electricity			\$1,400						
ŝ	#6 Fuel Oil			\$21,600						
(01)										
ŝ	TOTAL DOLLAR SAVINGS			\$23,000						
2002000	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specific	duites being per	Reflect specific duties being performed with additional manhours svailable (equivalent manyears)	al manhours evaileb	k (equivaknı man)	certy			

DATE (YYMMDD) DATE (YYMMDD) DATE (YYMMDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON (Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE & OTHER COORDINATION (Functional Coordination of local lew), e.g., Fac Brif, Log. Pers. etc.) 26. SUBMITTED BY (Typed name, grade and litte of Subordinate Command/Agency or Project Initiates) 26. APPROVAL RECOMMENDED BY (MACOM/Agency) 20. OTHER REMARKS (Cont'd) 27. APPROVED BY

PR FI	LIFE CYCLE CO ENERGY CONSERVATION STALLATION & LOCATION: DJECT NO. & TITLE: ECO SCAL YEAR 1992 DISC ALYSIS DATE: 10-14-91	) #9 PAINT   CRETE PORTION	BOOTH FAN CON NAME: TOTAL	TROLS PROJECT		
1.	INVESTMENT A. CONSTRUCTION COST B. SIOH C. DESIGN COST D. SALVAGE VALUE COS E. TOTAL INVESTMENT	ST	C - 1D)		\$ \$ -\$	4604. 254. 277. 0. 5135.
2.	ENERGY SAVINGS (+) / ANALYSIS DATE ANNUAL	COST (-) SAVINGS, UNI	IT COST & DISC	COUNTED SAVI	NGS	
	UNIT COST FUEL \$/MBTU(1)	SAVINGS MBTU/YR(2)				
	A. ELECT \$ 10.94 B. DIST \$ 4.98 C. RESID \$ 4.41 D. NAT G \$ .00 E. COAL \$ .00	124. 0. 4895. 0. 0.	\$ 1357. \$ 0. \$ 21587. \$ 0. \$ 0.	10.75 14.08 16.21 13.25 11.13		14583. 0. 349924. 0.
	F. TOTAL	5019.	\$ 22944.		\$	364507.
3.	NON ENERGY SAVINGS(+)	/ COST(-)				
	A. ANNUAL RECURRING ( (1) DISCOUNT FACT (2) DISCOUNTED SA	OR (TABLE A)	A X 3A1)	10.59	\$ \$	0. 0.
	C. TOTAL NON ENERGY D	ISCOUNTED SAV	/INGS(+)/COST(	(-)(3A2+3Bd4	)\$	0.
	B IF 3D1 IS C IF 3D1B IS	QUALIFICATION (NERGY CALC (2) = OR > 3C GO < 3C CALC = > 1 GO TO < 1 PROJECT	PF5 X .33) D TO ITEM 4 SIR = (2F5+3D D ITEM 4	01)/1F)		
4.	FIRST YEAR DOLLAR SAV	INGS 2F3+3A+(	3B1D/(YRS ECC	NOMIC LIFE)	)\$	22944.
5.	TOTAL NET DISCOUNTED	SAVINGS (2F5+	-3C)		\$	364507.
6.	DISCOUNTED SAVINGS RA (IF < 1 PROJECT DOES			1F)= 70.98	8	
7.	SIMPLE PAYBACK PERIOD	(ESTIMATED)	SPB=1F/4	.2	2	

ECO Number: 9

## PAINT BOOTH FAN CONTROL

# **Discussion**

Paint booth exhaust fans operate continuously during the shift when painting is to be done. However, the fan is required to operate only when paint is being applied.

This ECO provides controls for nine paint booths that will turn the fan off if no one has been in the paint booth for three minutes, and will turn it on whenever any one enters the booth.

### Recommendations

Based on the Life Cycle Cost Analysis, this project is recommended.

Construction Cost	\$4,604
Annual Energy Savings (MBtu/yr)	
No. 6 Oil	4,895
Electricity	124
Annual Energy Cost Savings (\$/yr)	\$22,900
SIR	71.0
Simple Payback (years)	0.2

-	
	2)

SUBJECT LETTERKENNY A.D.	AEP NO 290-0379-001
ELO 9	SHEETOF
DESIGNER Cx F.	DATE
CHECKER	DATE

ECO # 9 Paint Booth Fan Control : Blog 350, Booth # 61 CURRENT ENERGY COSTS

NO. 6 01'U

ASSUME: 68°F EXHAUST AIR, 2SHIFT OPERATION
74,233 BTU /CFM /YR.
12141 CFM EXHAUST FLOW
BOILER EFFICIENCY = 0.8

HEAT LOSS FY91 Fuel prices except for Q

HL = 74,233 B/cFm/yex 121411 CFM = 1127 MBTU /yR

HEAT LOSS COST

1130 MBTU/yR x 4.41/MBTU = 4983/yR

FLECTRICITY

ASSUME: 2 HP MOTOR (BKA, INC. REPORT)

ENERGY CONSUMED

2 HP X . 746 KW/HP X 16H/d X5-d/w X52 W/yr = 8210 KWL - 21. MBTL

6210 kwh x#0.0373 /kuh = \$230/4 R

TOTAL COST

\*4983/yR + \$230/yR =\$5213/yR

SAVINGS

ASSUME: FAN IS OFF FOR IL TIME

9-1

-	
	(0)

SUBJECT LAD	ECO #9	AEP NO	- Ši
		SHEET	OF
DESIGNER		DATE	<b>A</b>
CHECKED	7	DATE	

EAVINGS CONT.

No. 6 OIL ENERGY 1/27 MBTU/4R = 564 MBTU/4R

564MBTUL/4R x 4.41/meta = 2487/yr

ELECTRICITY

ENERGY

6210 kwh/yr = 3110 · kwh/yr = 11 · mbtu/yr

COST

3110 KWh/yr x \$0.0373/km=\$120/yr.

TOTAL SAVINGS

COST SAVINGS = OIL SAVINGS + ELEC. SAVINGS = \$2487/yr + \$120/yr

= #2607 /4R

ENERGY SAVINGS = 564 meth + 11 mach

= 575 mBtn/yr

Building Number: 350 Paint Booth No.: 2527

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu 5 HP Exhaust Fan Motor: Exhaust Air Flow: 25,959 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 74,233 Btu/cfm-Yr Operating Shifts: 2 /Day 5 /Week Operating Days:

#### Current Energy Use:

Current Heating Energy = 2409 MBtu/Yr

Heating Energy Cost = \$10,624 /Yr

Current Electric Use = 53 MBtu/Yr

Electricity Cost = \$580 /Yr

Current Energy Use = 2462 MBtu/Yr

Current Energy Cost = \$11,204 /Yr

### Savings if fan is turned off 50% of the time:

Heating Energy Savings = 1205 MBtu/Yr

Heating Cost Savings = \$5,314 /Yr

Electric Energy Savings = 27 MBtu/Yr

Electric Cost Savings = \$295 /Yr

Total Energy Savings = 1232 MBtu/Yr

Total Energy Cost Savings = \$5,609 /Yr

Building Number: 37
Paint Booth No.: 280

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 3 HP Exhaust Air Flow: 18,318 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 74,233 Btu/cfm-Yr Operating Shifts: 2 /Day Operating Days: 5 /Week

### Current Energy Use:

Current Heating Energy = 1700 MBtu/Yr

Heating Energy Cost = \$7,497 /Yr

Current Electric Use = 32 MBtu/Yr

Electricity Cost = \$350 /Yr

Current Energy Use = 1732 MBtu/Yr

Current Energy Cost = \$7,847 /Yr

# Savings if fan is turned off 50% of the time:

Heating Energy Savings = 850 MBtu/Yr

Heating Cost Savings = \$3,749 /Yr

Electric Energy Savings = 16 MBtu/Yr

Electric Cost Savings = \$175 /Yr

Total Energy Savings = 866 MBtu/Yr

Total Energy Cost Savings = \$3,924 /Yr

Building Number: 37
Paint Booth No.: 468

Heating Fuel Type: #6 Fuel Dil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 2 HP Exhaust Air Flow: 11,152 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 74,233 Btu/cfm-Yr Operating Shifts: 2 /Day Operating Days: 5 /Week

#### Current Energy Use:

Current Heating Energy = 1035 MBtu/Yr

Heating Energy Cost = \$4,564 /Yr

Current Electric Use = 21 MBtu/Yr

Electricity Cost = \$230 /Yr

Current Energy Use = 1056 MBtu/Yr

Current Energy Cost = \$4,794 /Yr

## Savings if fan is turned off 50% of the time:

Heating Energy Savings = 518 MBtu/Yr

Heating Cost Savings = \$2,284 /Yr

Electric Energy Savings = 11 MBtu/Yr

Electric Cost Savings = \$120 /Yr

Total Energy Savings = 529 MBtu/Yr

Building Number: 37
Paint Booth No.: 470

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 3 HP Exhaust Air Flow: 12,069 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 74,233 Btu/cfm-Yr

Operating Shifts: 2 /Day
Operating Days: 5 /Week

## Current Energy Use:

Current Heating Energy = 1120 MBtu/Yr

Heating Energy Cost = \$4,939 /Yr

Current Electric Use = 32 MBtu/Yr

Electricity Cost = \$350 /Yr

Current Energy Use = 1152 MBtu/Yr

Current Energy Cost = \$5,289 /Yr

## Savings if fan is turned off 50% of the time:

Heating Energy Savings = 560 MBtu/Yr

Heating Cost Savings = \$2,470 /Yr

Electric Energy Savings = 16 MBtu/Yr

Electric Cost Savings = \$175 /Yr

Total Energy Savings = 576 MBtu/Yr

Total Energy Cost Savings = \$2,645 /Yr

Building Number: 370 Paint Booth No.: 200

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 5 HP Exhaust Air Flow: 17,100 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 35,618 Btu/cfm-Yr Operating Shifts: 1 /Day Operating Days: 5 /Week

## Current Energy Use:

Current Heating Energy = 761 MBtu/Yr

Heating Energy Cost = \$3,356 /Yr

Current Electric Use = 26 MBtu/Yr

Electricity Cost = \$284 /Yr

Current Energy Use = 787 MBtu/Yr

Current Energy Cost = \$3,640 /Yr

# Savings if fan is turned off 50% of the time:

Heating Energy Savings = 381 MBtu/Yr
Heating Cost Savings = \$1,680 /Yr

Electric Energy Savings = 13 MBtu/Yr

Electric Cost Savings = \$142 /Yr

Total Energy Savings = 394 MBtu/Yr

Total Energy Cost Savings = \$1,822 /Yr

Building Number: 370
Paint Booth No.: 412

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 1.5 HP Exhaust Air Flow: 6,147 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 35,618 Btu/cfm-Yr Operating Shifts: 1 /Day Operating Days: 5 /Week

## Current Energy Use:

Current Heating Energy = 274 MBtu/Yr

Heating Energy Cost = \$1,208 /Yr

Current Electric Use = 8 MBtu/Yr

Electricity Cost = \$88 /Yr

Current Energy Use = 282 MBtu/Yr

Current Energy Cost = \$1,296 /Yr

#### Savings if fan is turned off 50% of the time:

Heating Energy Savings = 137 MBtu/Yr

Heating Cost Savings = \$604 /Yr

Electric Energy Savings = 4 MBtu/Yr

Electric Cost Savings = \$44 /Yr

Total Energy Savings = 141 MBtu/Yr

Total Energy Cost Savings = \$648 /Yr

Building Number: 370 Paint Booth No.: 3877

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% Electricity Cost: \$10.94 /MBtu Exhaust Fan Motor: 2 HP 11.956 CFM Exhaust Air Flow: Makeup Percentage: 100% 68 °F Exhaust Air Temp.: O A Heating Load: 35,618 Btu/cfm-Yr Operating Shifts: 1 /Day 5 /Week Operating Days:

#### Current Energy Use:

Current Heating Energy = 532 MBtu/Yr

Heating Energy Cost = \$2,346 /Yr

Current Electric Use = 11 MBtu/Yr

Electricity Cost = \$120 /Yr

Current Energy Use = 543 MBtu/Yr

Current Energy Cost = \$2,466 /Yr

## Savings if fan is turned off 50% of the time:

Heating Energy Savings = 266 MBtu/Yr

Heating Cost Savings = \$1,173 /Yr

Electric Energy Savings = 6 MBtu/Yr

Electric Cost Savings = \$66 /Yr

Total Energy Savings = 272 MBtu/Yr

Total Energy Cost Savings = \$1,239 /Yr

Building Number: 370 Paint Booth No.: 4298

Heating Fuel Type: #6 Fuel Oil Heating Fuel Cost: \$4.41 /MBtu Boiler Efficiency: 80% \$10.94 /MBtu Electricity Cost: Exhaust Fan Motor: 7.5 HP Exhaust Air Flow: 18,592 CFM Makeup Percentage: 100% Exhaust Air Temp.: 68 °F O A Heating Load: 35,618 Btu/cfm-Yr Operating Shifts: 1 /Day Operating Days: 5 /Week

#### Current Energy Use:

Current Heating Energy = 828 MBtu/Yr

Heating Energy Cost = \$3,651 /Yr

Current Electric Use = 40 MBtu/Yr

Electricity Cost = \$438 /Yr

Current Energy Use = 868 MBtu/Yr

Current Energy Cost = \$4,089 /Yr

#### Savings if fan is turned off 50% of the time:

Heating Energy Savings = 414 MBtu/Yr

Heating Cost Savings = \$1,826 /Yr

Electric Energy Savings = 20 MBtu/Yr

Electric Cost Savings = \$219 /Yr

Total Energy Savings = 434 MBtu/Yr

Total Energy Cost Savings = \$2,045 /Yr

ECO #9 Project Summary Fan Controls For Open Paint Booths Letterkenny Army Depot 10/21/91

4.41 4.41 10.94

		Ene	rgy Savin	gs (MBtu	/Yr)	Ener	gy Cost S	Gavings (	(\$/Yr)	CURREN	T COSTS	
Building Number	Booth   Number	#5 0il	#6 Oil	Elect	Total	#5 0il	#6 0il	Elect	Total	FUEL OIL	ELEC.	TOTAL
350	61		564	11	575	\$0	\$2,487	\$120	\$2,608	\$4,983	\$230	\$5,213
350	2527		1205	27	1232	\$0	\$5,314	\$295	\$5,609	\$10,524	\$580	\$11,204
37	280	850		16	866	\$3,749	\$0	\$175	\$3,924	\$7,497	\$350	\$7,847
37	468	518		11	529	\$2,284	\$0	\$120	\$2,405	\$4,564	\$230	\$4,794
37	470	560		16	576	\$2,470	\$0	\$175	\$2,645	\$4,939	\$350	\$5,289
370	200		381	13	394	\$0	\$1,680	\$142	\$1,822	\$3,356	\$284	\$3,640
370	412		137	4	141	\$0	\$604	\$44	\$648	\$1,208	\$88	\$1,296
370	3877		266	6	272	\$0	\$1,173	\$66	\$1,239	\$2,346	\$120	\$2,466
370	4298		414	20	434	\$0	\$1,826	\$219	\$2,045	\$3,651	\$438	\$4,089
Total	Project	1928	2967	124	5019	\$8,502	\$13,084	\$1,357	\$22,944	\$43,168	\$2,670	\$45,838

# 21,600

## LETTERKENNY ARMY DEPOT ENERGY AUDIT OF INDUSTRIAL FACILITIES

Operation Hrs/Day = 8

Room or Supply A Air Quantity (cf	ir Conditions - Winter )	68
Hour Fractions	1 AM - 9 AM	0.25
	9 AM - 5 PM	0.75
	5 PM - 1 AM	0

Operation Days Per Week

5

	Te <b>sp.</b> Range	Hours 6 2-9	of Occurren	nce 13-1	Total Hours	Delta H or T	Const.	CFM	8TU/HR	Total BTU
70	74	247	237	301	240	-4	1.08	1	0	0
65	69	236	217	278	237	1	1.08	1	1	258
60	64	269	196	236	214	6	1.08	1	6	1,388
55	59	249	191	209	206	11	1.08	1	12	2,441
50	54	221	193	202	200	16	1.08	1	17	3,456
45	49	218	193	206	199	21	1.08	1	23	4,519
40	44	237	236	239	236	26	1.08	1	28	6,634
35	39	289	246	286	257	31	1.08	1	33	8,596
30	. 34	304	194	258	222	36	1.08	1	39	8,612
25	29	184	106	152	126	41	1.08	1	44	5,557
20	24	124	65	90	80	46	1.08	1	50	3,962
15	19	75	32	57	43	51	1.08	1	55	2,355
10	14	54	13	26	23	58	1.08	1	60	1,406
5	9	18	3	9	7	61	1.08	1	66	445
0	4	9	0	2	2	66	1.08	i	71	160
-5	-1	3	Ú	1	i	71	1.08	i	7 <b>7</b>	58
-10	-6	1	0	0	0	76	1.08	1	82	21
-15	-11	0	0	0	0	81	1.08	i	87	0
tals		2798	2122	2552	2291					49,865
	ation Hou rected fo		Heating days/week	<b>(</b> )	1465			•		35,618
			·							

Avg outdoor temp while heating (F)

45.0

## LETTERKENNY ARMY DEPOT ENERGY AUDIT OF INDUSTRIAL FACILITIES

Operation Hrs/Day = 16

Room or Supply A Air Quantity (cf	ir Conditions - Winter a)	68 1
Hour Fractions	1 AM - 9 AM 9 AM - 5 PM	0.375 1
	5 PM - 1 AM	0.625
Operation Days Po	er Week	5

		Temp.	Hours	of Occurre	nce	Total	Delta				Total
		Range	2-9	10-17	18-1	Hours	H or T	Const.	CFN	BTU/HR	BTU
	70	74	247	237	301	518	-4	1.08	1	0	0
	65	69	296	217	278	502	1	1.08	1	1	542
	60	64	269	196	236	444	6	1.08	1	6	2,880
	55	59	249	191	209	415	11	1.08	1	12	4,930
	50	54	221	193	202	402	16	1.08	1	17	6,949
	45	49	218	193	206	404	21	1.08	1	23	9,151
	40	44	237	236	239	474	26	1.08	1	28	13,317
	35	39	289	246	286	533	31	1.08	1	33	17,849
	30	34	304	194	258	469	36	1.08	1	39	18,244
	25	29	184	106	152	270	41	1.08	1	44	11,956
	20	24	124	65	90	168	46	1.08	1	50	8,334
	15	19	75	32	57	96	51	1.08	1	55	5,274
	10	14	54	13	26	50	56	1.08	1	60	2,994
	5	9	18	3	9	15	61	1.08	1	66	1,013
	0	4	9	0	2	5	66	1.08	1	71	330
	-5	-1	3	0	1	2	71	1.08	1	77	134
	-10	-6	1	0	0	0	76	1.08	1	82	31
	-15	-11	0	0	0	0	81	1.08	1	87	0
Tot	als	******	2798	2122	2552	4766				:	103,927
Tot	al Oper	ation Hou	rs While	Heating							
				days/week	:)	3035					74,233

(and corrected for working days/week) 3035

Avg outdoor temp while heating (F) 45.0

# ECO Construction Cost Estimate Calculations

ECO Name: Walk-in Spray Booth Fan Control

ECO #: 9

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$1,179 \$1,683
Subtotal bare costs	\$2,862
FICA Insurance (20% of Labor)	\$337
Sales Tax (6.5% of Material)	\$77
Subtotal	\$3,276
Overhead (15%)	\$491
Subtotal	\$3,767
Profit (10%)	\$377
Subtotal	\$4,144
Bond (1%)	\$41
Subtotal	\$4,185
Contingency (10%)	\$419
Subtotal (Construction Cost Input For LCCID *)	\$4,604
SIOH (5.5% of Construction Cost)	\$253
Subtotal	<b>\$4,85</b> 7
Design (6% of Construction Cost)	<b>\$2</b> 76
Total Project Cost	\$5,133

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARE	0		SHEET	OF
PROJECT ENERGY ENGINEERING				<del></del>	BASIS F	OR ESTIM		•
LOCATION				•				in ampleted)
Letterkenny Army Depo			ot_		→ ``C	00E 8 (P:	(Final d	oolgn)
REYNOLDS, SMITH AND HILLS A				NC.		THER (Sp		
DRAWING NO.		ESTIN	ATOR	G.F.		CHECKE	thet	hirs
WALK-IN SPRAY BOOTH FAN CONTROL SUMMARY	QUANT	İTY		LABOR		MATERIA	r HALIO	
SUMMARY SUMMARY	NO. UNITS	UNIT MEAS.		TOTAL	PER	701	ral.	COST
OCCUPENCY SENSOR		ĒΑ	25	25	80	3	30	105
CONDUIT 1/2" &	50	LF	2.97	1:49	.96	4	18	197
wire 2-14	0.5	CLF	2478	/3	6.22		3	16
Subtotal For 1 Booth				187				2.0
X No. of Booths			_	× 9		/ <u>·</u>	3 <u>1                                    </u>	3/8
					+			
Total Bare Costs				\$1,683		#11	79	#2862
								,
		$\longrightarrow$						
							•	
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		十						
						<del></del>		

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\* U.S. GOVERNMENT

(ER 1110-345-730))

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTM	NVESTMENT PROGRAMS	1. PROJECT NO.		REQUIREMENT C	REQUIREMENT CONTROL SYMBOL
For use of this form, see AR 5-4; the proponent agency is OCA.	CA.	AMC QRIP			DD-M(R) 1561
.,		Commander		6. DOD COMP NAME Army	6. DOD COMP CODE
th: DACS-DME	AMCMM-M	Attn: AMSDS-RM-P Chambersburg, PA 17201-4170	RM-P PA 17201-417	7. COMMAND CODE  1. W730KK	0. DATE 10/9/91
70310-7070 I VIEVBIIN	10. TYPE OF PROJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	N8/MC	
Blast Booth Exhaust Fan Controls	Owner X	OSD PIF   PECIP	7,280	+ 17,613	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cost)	(Average Annual Serbigs)	Serbigy (Na. May
024	15		0.4 or	(months)	(emortization)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION	pasii awa	to allow blast booth exhaust fans	booth exhaust	fans to
Commander	operate only w	are useu nen doors	are closed.	מסחניו ביוומת	
Letterkenny Army Depot Attn: SDSLE-EM (T. Hagie)					
Bldg. 663 Chambersburg, PA 17201-415D				٠	
IL DETAILED JUSTIFICATION					
Currently, blast booth exhaust fans remain on continuously throughout the work shifts. will save energy by shutting down exhaust fans when booths are not in use.	is remain on continuously exhaust fans when booths	uously throughout the booths are not in use.	out the work s in use.		This project
19. SAVINGS DISPOSITION					
Savings are used to reduce energy exper	expenditures				
			-		
20. OTHER REMARKS (Continue on page 6, if more space is needed)					

315				SUMM.	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	VINGS				•
			Allec	119ch computation sheet identifying the method and source of data for savings	entifying the method a	nd source of data for s	avings			
				PROPOSED METHOD	METHOD			DIFFERENCE/SAVINGS	SAVINGS	
_	BREAKOUT	METHOD	18T YR	2D VR	30 VR	4TH YR	18T Y.R.	2D VR	3D YR	4TH YR
SAL	SALARY/LABON/ OVERTIME									
MAI	MATERIAL/ SUPPLIES									
5	UTILITIES									
ME	MAINTENANCE/ REPAIR									
Ě	TRANSPORTATION									
LEA	LEASE COSTS									
TUT	SALVAGE/ TURN-IN									
E.	Electricity	\$37,919	\$20,306	\$20,306	\$20,306	\$20,306	\$17,613	\$17,613	\$17,613	\$17,613
8	CONTRACT COSTS									
Ď	OTHER (Identify)									
	TOTALS	\$37,919	\$20,306	\$20,306	\$20,306	\$20,306	\$17,613	\$17,613	\$17,613	\$17,613
4	11				PRIORITIZATION					
3		E   5	7,280 by avera	by average annual savings 17,613 = 0.4 factor. alc life of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	17,613 -the IRR from Table	0.4 H-3, App H, Ch. 5,		300+ SIRR.	넑	
(2)	- 1	TAA	an a	7	0 0 0					
	Multiply annual savings. (undiscounted)	d eavings 17,613 7,280 nomic life 15	1	X discount factor / . 98 = 140,532 and divi	140,330	140,332 and divide by present value of investment App H, Ch. 5, AR 5-4.	eent value of inv	etime nt		
3	1	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	WER SPACE (RIMS)	N/A				8718		
	Divide setimate (Menpower req	Divide estimated project cost by number (Manpower regultalents cannot be used in this computation.)	by n	by number of manpower space savings, putetion.)	r space savings					

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				1
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS REQUIRED
1	4	¢1 820	2 4	\$7.280		
m Limit Switches		270674				
(8)						
(6)						
(1)						
(6)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT <sup>2</sup>		e Teu'	,			
(10) FACILITIES MODIFICATION <sup>3</sup>						
(11) TRAINING						
(12) OTHER (Specify):					·	
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OPERATIONA	ME OPERATIONAL			\$7,280		
(14) TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			\$7,280		7 1 1
(16) TOTAL AMOUNT OF FUNDING REQUIR	UNDING REQUIRED FROM OTHER SOURCE			•		.4
(16) TOTAL (8um of (14) + (16) above)	16) above)			\$7,280		
Not to exceed 10% of equipment cost for QRIP projects.	projects					

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

TIEMS  NO. WAT TOO PARTICLE TO TOO PARTICLE TO TOO PARTICLE TOO PARTIC	ន់			G	UMMARY OF SAVI	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
TITEMS NO. USE TO A FOLD T				SAVINGS				REAPPLICATION O	F SAVINGS		
AUTHORIZATIONS ELIMINATED AUTHORIZATIONS ELIMINATED SOMEOUNE WILLTANY MANTONE DI MILITANY MANTONE MANT		ITEMS	NO. MPR OR MHR	TVPE	DOLLARS	PROGRAMI	ELEMENT	TDA PARA	AND LINE	FUNCTION CODE	N CODE
REQUIREMENTS AND AUTHORIZATIONS ELIMINATED REQUIREMENTS ONLY ELIMINATED OVERHIRES OR TEMPORARIES TEMMINATED MANHOURS SAVED FROM MULTIPLE POSITIONS? OTHER DOLLAR SAVINGS (Rachading Mempower), 4-5. CONTRACT COSTS & UTILITIES CONTRACT COSTS & UTILITIES  E] ECTL'ICITY  E] ECTL'ICITY  1) US Graded 2) US Wage Board 3) DHFN 5) Officer 5) WO		•	•	ú			ή. το	g. FROM		L FROM	, to
REQUINEMENTS ONLY ELIMINATED  BORROWED MILITARY MANPOWER RELEASED  OVERHIRES OR TEMPORARIES TERMINATED  MANHOURS SAVED FROM MULTIPLE POSITIONS?  OTHER DOLLAR SAVINGS (Excluding Mempower), 4.5. CONTRACT COSTS & UTILITIES  CONTRACT COSTS & UTILITIES  CONTRACT COSTS & UTILITIES  CONTRACT COSTS & UTILITIES  TOTAL DOLLAR SAVINGS  1) US Graded  2) US Graded  2) US Graded  3) DIFFN  9) DIFFN  9) HFN  1) IFFN  1) IFFN	3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
BONROWED MILITARY MANPOWER RELEASED  OVERHIRES OR TEMPORARIES TERMINATED  HOURS OVERTIME ELIMINATED  OTHER DOLLAR SAVINGS (Excluding Mempower), 4.5. CONTRACT COSTS & UTILITIES  CONTRACT COSTS & UTILITIES  TOTAL DOLLAR SAVINGS  1) US Graded 3) US Graded 3) US Graded 3) DMFN 4) HFN 6) INFN 6) WOF	3	REQUIREMENTS ONLY ELIMINATED									
OVERHINES ON TEMPORARIES TEMMINATED HOURS OVERTIME ELIMINATED MANHOURS SAVED FROM MULTIPLE POSITIONS? OTHER DOLLAR SAVINGS (Excluding Membours), 4.5. CONTRACT COSTS & UTILITIES CONTRACT COSTS & UTILITIES  E] ECTL'ICITY  I US Graded 32 US Wage Board 31 US Wage Board	દે	BORROWED MILITARY MANPOWER RELEASED									
HOURS OVERTIME ELIMINATED MANHOURS SAVED FROM MULTIPLE POSITIONS?  OTHER DOLLAR SAVINGS (Exchiding Membours), 4.4. CONTRACT COSTS & UTILITIES  Electricity  TOTAL DOLLAR SAVINGS  1) US Graded 3) US Maye Board 3) DHFN 4) IHFN 6) INFN 6) WO	€	OVERHIRES OR TEMPORARIES TERMINATED									
MANHOURS SAVED FROM MULTIPLE POSITIONS?  OTHER DOLLAR SAVINGS (Excluding Memboure), e.g. CONTRACT COSTS & UTILITIES  Electricity  TOTAL DOLLAR SAVINGS  1) US Graded 3) US Mage Board 3) DHFN 4) Officer 5) WO	(9)	HOURS OVENTIME ELIMINATED									
CONTRACT COSTS & UTILITIES CONTRACT COSTS & UTILITIES CONTRACT COSTS & UTILITIES Electricity  TOTAL DOLLAR SAVINGS 1) US Graded 2) US Mage Board 3) DHFN 6) Officer 6) WO	9	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
Electricity  TOTAL DOLLAR BAVINGS  1) US Graded 3) DHFN 5) Officer 6) WO	3	OTHER DOLLAR SAVINGS (Excluding Mempower), e.g., CONTRACT COSTS & UTILITIES						·			
TOTAL DOLLAN BAVINGS  1) US Graded 3) DHFN 6) HFN 6) HFN 6) W.	€	Electricity			\$17,613						
TOTAL DOLLAN BAVINGS  1) US Graded 3) US Wage Board 5) DHFN 6) HFN 6) HFN 6) W.	ê										
TOTAL DOLLAR SAVINGS  US Graded  US Wage Board  DHFN  Officer	702										
(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO	110				\$17,613						
(7) Enlisted			Reflect spect	c duties being pe	rformed with addith.	mel menkour ersilel	bk fequivaknt man,	Vears			

24. REGULATORY API	REGULATORY APPROVAL/COORDINATION	
INVESTME	Investment statement	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	t or facilities. This investment is in accordance with established investm latory constraints.	nt planning.
	•	
(Cite regulatory approvals, e.g., TAGO Co.	regulatory approveds, e.g., TAGO Control Na.) (Ex. New Start, TAGO Approvel, etc.)	
t. OTHER COORDINATION (Functional Coordination of local lawi, e.g., Fee Eng, Log. Per etc.)		
26. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Initiator)	SIGNATURE	DATE (YYMMDD)
	N .	AUTOVOM
28. APPROVAL RECOMMENDED BY (MACOM/Agricy)	SIGNATURE	DATE (YYMNDD)
	אַ	AUTOVON
	FOR USE BY HQDA ON OSD PIP PROJECTS ONLY	
27. APPROVED BY		DATE (YYMNDD)
		AUTOVON
PO. OTHER REMARKS (Cont'd)		

ECO Number: 11

BLAST BOOT FAN SHUT-OFF (BUILDINGS 350 AND 37)

## Discussion

The blast booth exhaust fan draws air from the building interior, circulates it through the booth and a bag house, and discharges it back into the building. This fan must be operated whenever blasting is under way. However, there is no reason for the fan to operate when the blast booth is not being utilized and the doors are open.

This ECO provides electrical equipment that will automatically stop the exhaust fan when the large booth doors are not fully closed. One limit switch mounted on each pair of doors will indicate the doors are closed and the fan may be started. The fan will operate until one of the large doors opens, or until the stop button is depressed.

### Recommendations

Based on the Life Cycle Cost Analysis, this project is recommended.

Construction Cost	\$6,529
Annual Energy Savings (MBtu/yr)	
Electricity	1,610
Annual Energy Cost Savings (\$/yr)	\$17,613
SIR	26.0
Simple Payback (years)	0.4

PR FI:	STALLATION OJECT NO. SCAL YEAR	N & LOCATION: & TITLE: ECC 1991 DISC	OST ANALYSIS S I INVESTMENT I LETTERKENNY D #11 BLAST CRETE PORTION ECONOMIC L	ARREGION NOS BOOTH FAN CO NAME: TOTAL	. 3 CENSUS: NTROL (B350) PROJECT	1	
1.	B. SIOH C. DESIG D. SALVA	TRUCTION COST ON COST NGE VALUE COS		C - 1D)		\$ \$ -\$	6529. 359. 392. 0. 7280.
2.	ENERGY SA ANALYSIS	AVINGS (+) / 5 DATE ANNUAL	COST (-) SAVINGS, UNI	T COST & DIS	COUNTED SAVI	NGS	
		\$/MBTU(1)	SAVINGS MBTU/YR(2)	SAVINGS(3)	FACTOR(4)	SAV	COUNTED INGS(5)
	A. ELECT B. DIST C. RESID D. NAT G E. COAL	\$ 10.94 \$ 7.43 \$ 6.61 \$ .00 \$ .00	1610. 0. 0. 0. 0.	\$ 17613. \$ 0. \$ 0. \$ 0. \$ 0.	10.75 14.08 16.21 13.25 11.13		189344. 0. 0. 0.
	F. TOTAL		1610.			\$	189344.
3.	NON ENERG	Y SAVINGS(+)	/ COST(-)				
	(1) D	RECURRING ( ISCOUNT FACT ISCOUNTED SA	+/-) OR (TABLE A) VING/COST (3A	X 3A1)	10.59	\$ \$	0. 0.
	C. TOTAL	NON ENERGY D	ISCOUNTED SAV	INGS(+)/COST	(-)(3A2+3Bd4)	)\$	0.
	(1) 2	5% MAX NON E A IF 3D1 IS = B IF 3D1 IS = C IF 3D1B IS	QUALIFICATIONERGY CALC (2 = OR > 3C GO CALC = > 1 GO TO CALC CALC CALC CALC CALC CALC CALC CAL	F5 X .33) TO ITEM 4 SIR = (2F5+30 ITEM 4	01)/1F)		
4.	FIRST YEAR	R DOLLAR SAV	INGS 2F3+3A+(	3B1D/(YRS ECC	NOMIC LIFE)	\$	17613.
5.	TOTAL NET	DISCOUNTED :	SAVINGS (2F5+	3C)		\$	189344.
6.		D SAVINGS RA <sup>*</sup> PROJECT DOES	TIO NOT QUALIFY)	(SIR)=(5 /	1F)= 26.01	l	
7.	SIMPLE PAY	YBACK PERIOD	(ESTIMATED)	SPB=1F/4	.41	l	

7.0	D.7	
	75	
		_

SUBJECT LETTER KENNY A D.	AEP NO 290-0379-001
ECO#11	SHEETOF
DESIGNER 6 E	DATE
CHECKER PITTERMS	DATE

ECO #11

BLAST BOOTH FAN SHUT-OFF (BOOTH 49)

REF 1. LEAD, EEAR, RSH, 1981, VOL 2, PROJ-H, CALC. PQ V-L

CURRENT ENERGY CONSUMPTION

ELECTRICITY

ASSUME: FLOW = 44,000 CFM (REF. 1)

AP DUCT WORK & BAGS = 5 IN.W.L.

n FAN & MOTOR = .6

FAI, HI - ACFM X S.P = 44000 X 5.0 = 58 ,70

KW = 1746 X HP - 43 KW

ENERGY CONSUMED.

ASSUME: 3CHIFT/day, 5d/wh

4220 294: 11 1. E-Van 152 wilder 268,000 kwhr./4R

COST OF ENERS,

7/6 mBT 1/JRX #10,94. mBTU = \$10,000 /4R.

SAVINGS

ASSUME! BLASTING OCCURS FOR ONLY 1/2 TIME

916 mBTU 14R X.5 = 45-3 MBTU/yR (elec.)

COSTS
458 MBTU 14R X \$10.94/MBTU = \$5010/4R

11-1

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H	
	<del></del> ®

SUR ECT	LEAD	Eco #11	AEP NO
000000			SHEET OF S
DESIGNER			DATE
CHECKER			DATE

ECO-11 (CONT)

BLAST BOOTH FAN SHUT-OFF (BOOTH 50) REF 2: LEAD, EEAP, RSH, 1981. VOL Z, PROJ-H, CALC. pg VI-1

CURRENT ENERGY CONSUMPTION ASSUME: FLOW = 56,000 CFM (REF 1) AP DUCT & BAGS = 5 in. W.C. n FAN & MOTOR = 0.6

FAN HP = ACFMX S.P. = 56:000 X 5 = 73.4 HP

Kw = .746 LW/40 x = 0 = .746 x 73.4 = 54.8 Kw

ENERLY CONSUMED

ASSUME 3 SHIFT /day, Ed/wk, SZWK/412

54.8 kw x 24 H/d x 5d/wk x52wk/yr = 342,000 kwh/yr.

342,000 kw h/412 X 34/3 Bta/kwh = 1170 METU/4R 1170 \* 10.94 = \$12,800/40

SAVINAS

ASSUME BLASTING OCCURS FOR 1/2 TIME

1170 MBTULYE X 0.5 = 583 MBTULYE (elec.)

583 MBTU/4R X\$10.94/MBTU = \$6380/4R

R	Si	H
		<b>A</b>

SUBJECT	LEAD	ECO #11	AEP NO _			
				_	_of5	
DESIGNER_			DATE			
CHECKER			DATE			

ECO -11 (CONT

BLAST BOOTH PAN SHUT-OFF (BOOTH 2544)

REF 3: LEAD, FEAR, RSH, 1981, VOL. Z, PROJ- H, CALC. PQ VII-1

CURRENT ENERGY CONSUMPTION

ASSUME: FLOW = 44,000 CFM (REF 3)

AP DUCT & BAGS = 5 IN. W.C.

Y FAN & MOTOR = 0.6

VALUES ARESAME AS BOOT 49 (pg. 11-1) SO SAVINGS WILL BE THE SAME.

Energy savings = 458 mistra/yr (elac.)

T		0	_7	
H	*		5	
_			_	<b>—</b> ®

SUBJECT	LEAD	ECO #11	AEP NO_				_
			SHEET	4	OF	5	_
DESIGNER _			DATE				_
CHECKER			DATE				_

ECO (CONT.)

BLAST BOOTH FAN SHUT OFF BLOG 37

REF 4: LEAD, EEAP, RSH, 1981, VOL. 2, PROJ H, CALC. pg X-1

FAN MOTOR HP = 20 (REF4)

CURRENT ENERGY CONSUMED

20 HP X . 746 XW/HP X 16 H/d X 50/W X5\_ W/FF = 62100 Kun

212 × 10.94 = \$2319

SAVINAS

ASSUME: BLASTING OCCURS = TIME,

ENERLY

212 mBru/yR x 0.5 = 106 mBru/yr ELEC

106m BTU/YR X \$10.94/MBTU = \$1160/yR

RSH.

SUBJECT LEAD ECO# | AEP NO SHEET S OF S

DESIGNER DATE

DATE

SAVINGS

BLPG
350
350
350
350
350
350
350
350
350

ENERGY

(MRTLELEC/4/2)

458

5010

583

458

5010

1140

17,600

CONSTRUCTION COST

FOR ALL 4 BOOTHS = \$6530

PAYBACK

TOVAL

\$7280 = 04/ YRS.

QRIP Call's

Ourrent energy use: \$10,000 + \$12,800 + \$12,800 + \$2319 = \$\frac{4}{37,919}

# ECO Construction Cost Estimate Calculations

ECO Name: Building 350 &37 blast booth fan control

ECO #: 11

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$1,150 \$2,850
Subtotal bare costs	<b>\$4,</b> 000
FICA Insurance (20% of Labor)	\$570
Sales Tax (6.5% of Material)	\$75
Subtotal	<b>\$4,</b> 645
Overhead (15%)	<b>\$6</b> 97
Subtotal	<b>\$5,</b> 342
Profit (10%)	<b>\$5</b> 34
Subtotal Bond (1%)	<b>\$5,</b> 876 \$59
Subtotal	<b>\$5,</b> 935
Contingency (10%)	<b>\$5</b> 94
Subtotal (Construction Cost Input For LCCID *)	\$6,529
SIOH (5.5% of Construction Cost)	<b>\$</b> 359
Subtotal	<b>\$6,</b> 888
Design (6% of Construction Cost)	\$392
Total Project Cost	\$7,280

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

						_		
CONSTRUCTION COST ESTIMATE				DATE PREPARED SHEET OF				or
PROJECT ENERGY ENGINEERING ANALYSIS						OR ESTIM		
LOCATION					1		(No dealgr eliminary o	n completed)
Letterkenny Army Depot					_	] CODE C	(Final des	•
REYNOLDS, SMITH AND		A.E	.P., I	NC.		HER (Spi		
DRAWING NO.		ESTIM	ATOR	G.F.	CHECKED BY Huching			
AUTO SHUT DOWN	QUANT	ITY		LABOR		ATERIA		
BLAST BOOTH SUMMARY	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER	701	AL	COST
Limit SwiTCHES	۵	ea	32	64	42	8	74	148
WIRE 2-14	2	CLF	24.78	57	4.22	1	2	66
CONQUIT 12" \$	200	LF	2.97	594	.96	19	2	786
COST PER BOOTH				712		28	38	1000
4 BOOTHS.		•		X 4		×	4	× 4
				2850		115	0	4000
		·						
·								
								<u> </u>
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\* W.S. GOVERNMENT PRINTING OFFICE . 1999 0-016146

(ER 1110-345-730))

CI. AR II

記 A. DOD COMP CODE 10/9/91 REQUIREMENT CONTROL BYMBOL × Install modular offices with self-contained heating and cooling 8. DATE Reset open area DD-M(R) 1601 1. DOD COMP NAME COMMAND CODE 13,600 (menths) W730KK 11. AMORTIZATION YEARCHTHE systems in three warehouses (#63, 8 and 9). thermostats from 68°F to 55°F. Commander Commander US DESCOM Attn: AMSDS-RM-P Attn: AMSDS-RM-P (Prefect Coa) 1.9 26,039 F | OBD P1F 14. EXPECTED OPER AMC QRIP 1. PROJECT NO. 18. TYPE OF PROJECT (Check enc) 17. PROJECT DESCRIPTION Attn: AMCMM-M 5001 Eisenhower Ave. 12 SCONOMIC LIFE DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS 25 yrs **§** For was of this form, as AA E4; the proposem apency is OCA. 14. UNIT ID COOL is functional area where bavings will occur Chambersburg, PA 17201-4150 Pentagon Washington, DC 20310-2070 Modular Personnel Offices SDSLE-EM (T. Hagie) Letterkenny Army Depot SUBMITTING UNIT(S) HO DA Attn: DACS-DME 024 A PROJECT TITLE Bldy. 663 Commander Attn:

temperatures in open storage areas while maintaining higher comfort levels in the modular offices. This action will save heating fuel oil. Installing modular offices in storage warehouses will allow the occupants to decrease the space heating

A DETAILED JUSTIFICATION

# M. BAVINGS DISPOSITION

Savings are used to reduce energy expenditures.

22. OTHER REMARKS (Continue on page 5, 1/ more apose to needed)

16				SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	DOLLAR)	nulnes			
			Alleca	PROPOSED METHOD	METHOD			DIFFERENCE/SAVINGS	E/SAVINGS	
3 8	SAVINGS	METHOD	18T YR	2D Y.M.	30 YR	4TH YR	1ST YR	20 VR	30 VR	4TH YR
ALARY/L	ALARY/LABOR/									
WPLIES	74.									
TILITIES										
REPAIR	IAINTENANCE/ IEPAIR									
RANGE	NANSFORTATION	,								
EASE	EASE COSTS									
TOUN'IN	OE/									
Elec	NEMOY (Mentity) Electricity	\$36,100	\$22,500	\$22,500	\$22,500	\$22,500	\$13,600	\$13,600	\$13,600	\$13,600
ONTE	SONTRACT COSTS	-							·	
THER	THER (Identify)									
=	TOTALS	\$36,100	\$22,500	\$22,500	\$22,500	\$22,500	\$13,600	\$13,600	\$13,600	\$13,600
					PRIORITIZATION					
8	NTERNAL RAT	INTERNAL RATE OF RETURN (IRR)  Divide estimated project cost 26,039 by av		by average annual savings \$13,600 = 1,9 factor.	\$13,600	1, 9 f.	factor. 6, AR 6-4 =	65 <b>* IRR</b>	g	
	NO. 100 PAGE									
(2)	BAVINGS TO INVESTMEN	SAVINGS TO INVESTMENT RATIO (3/1) Multiply annual savings $13,600$	X discount	factor 9,524	129,50	129,500 and divide by present value of investment	went value of in	vestment		
	(Based on economic life 25	, 26,039 somic life 25	years, select disce	years, select discount factor from Table H-4, App H, Ch. 5, AR 5-4.	ble H-4, App H, Ch.	6, AR 6-4.				
(3)	RATE OF INVE Divide estimati (Manpower req	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)  Divide setimated project cost by number (Manpower requirelens cannot be used in this computation.)	WER SPACE (RIMS)  By nued in this compute	N/A number of manpower space savings	r space savings	-		RIMS.		

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				,
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY DR PROGRAM ELEMENT	FY FUNDS
•	٩	3	9		,	,
" Modular Offices		\$8,680	8	\$26,039		
(8)						
(3)						
(9)						
(9)						
(6) TRANSPORTATION (Equipment delivery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT <sup>2</sup>		1 A				
(10) FACILITIES MODIFICATION <sup>3</sup>						
(11) TRAINING						
(11) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OPERATION	OME OPERATIONAL			\$26,039		
(14) TOTAL AMOUNT OF FUNDING REQUES	FUNDING REQUESTED IN THIS PROPOSAL			\$26,039		. T. 12. T. 13. T.
(16) TOTAL AMOUNT OF FUNDING REQUIR	FUNDING REQUIRED FROM OTHER SOURCE					
(16) TOTAL (8um of (14) + (16) abour)	(16) about)			\$26,039		

I Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

<sup>3</sup>Normally not OPA funded

Used to compute amortitation in Item 11.

 $<sup>^{</sup>S}$ specify source to include certification that funds are available, if financed from the regular budget:

ij			**	UMMARY OF SAV	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
			BAVINGS			<b>A</b>	REAFFLICATION OF SAVINGS	FSAVINGS		
	ITEM	NO. MPR	TYPE	DOLLARS	PROGRAM	PROGRAM ELEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
	•	•	٠	•	e. FROM	f. TO	f. FROM	л. то	L FROM	, 10
8	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED			•		·				
8	REQUIREMENTS ONLY ELIMINATED									
રે	BORROWED MILITARY MANPOWER RELEASED									
€	OVERHIRES OR TEMPORARIES TERMINAȚED									
9	HOURS OVERTIME ELIMINATED									
•	MANHOURS SAVED FROM MULTIPLE POSITIONS?						·			
3	OTHER DOLLAR SAVINGS (Excluding Manpower), e.e. CONTRACT COSTS & UTILITIES									
•	#2 Fuel Oil			\$13,800						
ê	Electricity			-200						
(0)	0									
an	) TOTAL BOLLAR SAVINGS			\$13,800						
0	(1) US Graded (2) US Waye Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specifi	c duiks being pe	rformed with oddle	Reflect specific dutes being performed with additional manhours available (equinalens manyears)	sbk (equivakni man	yeart			

Page 4 of DA Form 5104-R

Figure H-1. Documentation for Productivity Capital Investment Program (DA Form 5108-R)—Continued.

C 1, AR 5-4

1 August 1982

24. REGULATORY APPR	REGULATORY APPROVAL/COORDINATION	
INVESTMEN	Investment statement	1
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	or facilities. This investment is in accordance with established investments constraints.	nt planning.
	•	
(Cite regulatory approvals, e.g., TAGO Contr	(Cite regulatory approvals, e.g., TAGO Cantrol Na.) (Ex. New Start, TAGO Approval, etc.)	
h. OTHER GOORDINATION (Functional Coordination at local lawi, e.g., Fac Eng. Log. Pers. etc.)		
28. SUBMITTED BY (Typed nems, grade and litte of Subordinete Command/Agency or Profect Initiator)	SIGNATURE	DATE (YYMMDD)
	NA .	AUTOVON
28. APPROVAL RECOMMENDED BY (MACOM/Agency)	SIGNATURE	DATE (YYMNDD)
	אָל	AUTOVON
	FOR USE BY HQDA ON OSD PIF PROJECTS ONLY	
ZZ. APPROVED BY		DATE (YYMNDD)
		AUTOVON
PO OTHER REMARKS (Cont'd)		

ECO Number: 15

### MODULAR OFFICES IN BUILDINGS 6 SOUTH, 8 AND 9

#### Discussion

The temperature in these warehouses is maintained at 68°F (and higher) primarily for operator comfort. A tremendous amount of energy is required to heat the entire warehouse to 68°F. This project consists of installing modular 10 X 12 foot offices inside these warehouses, maintaining 68°F in the offices and reducing the temperature of the warehouse to 55°F. The results are shown below.

#### Recommendations

Based on the Life Cycle Cost Analysis, this project is recommended.

Construction Cost	\$23,352
Annual Energy Savings (MBtu/yr)	
No. 2 Fuel Oil	2,775
Electricity	(20)
Annual Energy Cost Savings (\$/yr)	\$13,600
SIR	11.2
Simple Payback (years)	1.9

```
STUDY: ECO15
           LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID : INSTALLATION & LOCATION: LETTERKENNY ADREGION NOS. 3 CENSUS: 1
                                                        LCCID 1.062
                              MODULAR OFFICES IN WAREHOUSING
PROJECT NO. & TITLE: ECO #15
                   DISCRETE PORTION NAME: TOTAL PROJECT
FISCAL YEAR 1992
ANALYSIS DATE: 10-14-91 ECONOMIC LIFE 25 YEARS PREPARED BY: W. TODD
1. INVESTMENT
                                                                     23352.
    A. CONSTRUCTION COST
                                                                      1285.
    B. SIOH
                                                                      1402.
    C. DESIGN COST
                                                                         0.
    D. SALVAGE VALUE COST
                                                                     26039.
    E. TOTAL INVESTMENT (1A + 1B + 1C - 1D)
2. ENERGY SAVINGS (+) / COST (-)
    ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS
                                                                DISCOUNTED
                                                    DISCOUNT
                                       ANNUAL $
                          SAVINGS
             UNIT COST
                                                    FACTOR(4) SAVINGS(5)
                                       SAVINGS(3)
                         MBTU/YR(2)
             $/MBTU(1)
    FUEL
                                                                     -3306.
                                                       15.11
                                            -219.
                             -20.
    A. ELECT $ 10.94
                                                                    294494.
                                                        21.31
                                       $
                                           13820.
    B. DIST $ 4.98
                            2775.
                                                                         0.
                                                        25.22
                                       $
                                               0.
                               0.
    C. RESID $ 4.41
                                                                         0.
                                                        20.70
                                       $
                                               0.
                               0.
                  .00
    D. NAT G $
                                                                         0.
                                                        15.93
                                       $
                                               0.
                               0.
                  .00
    E. COAL $
                                                                    291187.
                            2755. $ 13601.
    F. TOTAL
3. NON ENERGY SAVINGS(+) / COST(-)
                                                                         0.
   A. ANNUAL RECURRING (+/-)
                                                        14.53
       (1) DISCOUNT FACTOR (TABLE A)
                                                                         0.
       (2) DISCOUNTED SAVING/COST (3A X 3A1)
                                                                         0.
   C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)$
   D. PROJECT NON ENERGY QUALIFICATION TEST
                                                           96092.
        (1) 25% MAX NON ENERGY CALC (2F5 X .33)
             A IF 3D1 IS = OR > 3C GO TO ITEM 4
                                     SIR = (2F5+3D1)/1F)
             B IF 3D1 IS < 3C CALC
             C IF 3D1B IS = > 1 GO TO ITEM 4
             D IF 3D1B IS < 1 PROJECT DOES NOT QUALIFY
4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1D/(YRS ECONOMIC LIFE))$ 13601.
                                                                    291187.
 5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C)
                                         (SIR)=(5 / 1F)=
                                                           11.18
 6. DISCOUNTED SAVINGS RATIO
     (IF < 1 PROJECT DOES NOT QUALIFY)
                                                          1.91
 7. SIMPLE PAYBACK PERIOD (ESTIMATED) SPB=1F/4
```

REYNOLDS,	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS · PL	ANNERS
11	CORPORAT	ED	

SUBJECT Modular Offices	AEP NO 290 -0 379 -001
LEAD	
CHECKER P. Toda CHECKER P. Toda	DATE 4/13/91
CHECKER P. Hutchina	DATE Rev. 9-25-91

			No prince of a supplemental state of the sup			
ECO	# 15			and the second s		a sala salahan sedan jakan kerasa
	Modular offices	for pers	sonnel in	Ruilding.	s 65,	3 = 9.

## Assumptions:

- 1. The indoor temperature for these wavehouses is currently maintained at 68°F.
- 2. The heating for these buildings is provided by the boilers in building 8, which burn Fuel oil # 2.
- 3. The operation hours for these buildings are 8 hours per day, 5 days per week (2080 hrs/yr.)
- 4. The wavehouse temperature can be reduced to 55°F while maintaining 68°F in the modular offices.
- 5. The modular offices will also be cooled to 75°F.
  during the summer months.
- 6. The average indoor temperature during the summer months is currently about 80°F.
- 7. Since the wall and roof U-values and the infiltration rate do not change, the heat losses from the buildings is determined by the indoor-ontdoor temperature difference and the amount of time heating is required.

15-1

	BUBJECT Modular LEAD	Offices	AEP NO	*********
OLDS, SMITH AND HILLS			SHEET.	_ 2
TECTS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER WTT		DATE	
	CHECKER		DATE	4
	3			
1				. :
Current energy	consumption	:		
the state of the s	water was a contract of the co	The state of the s		
Annual Fuel o	il deliveries.*	FY 87	= 71,478	gally
		FY 38	= 63,607	
		FY 89	= 27,283	
		FY 90	= 46,446	
			-13,110	 -
· · · · · · · · · · · · · · · · · · ·				
		lotal	208814	001/14
en e		Total	208,814	ga1/4
* From Lette	rkennu Armu De			
* From Lette Building	rkenny Army De B boilers.			
* From Lette Building	rkenny Army De 8 boilers.			
The second secon		pot, Fuel	Consumpt	ion R
* From Lette Building Average fuel o		pot, Fuel	Consumpt	ion R
The second secon		pot, Fuel	Consumpt	ion R
Average fuel o	il consumption =	208,814 go 4 years	Consumpt = 52,2	ion R
Average fuel o	il consumption =	208,814 go 4 years	Consumpt = 52,2	ion R
Average fuel o	il consumption =	208,814 go 4 years	Consumpt = 52,2	ion R
Average fuel o Buildings 6, 8 Size so the	il consumption =  and 9 are a  energy use for	208,814 go 4 years pproximatel each bui	Consumpt  il = 52,2  y the s  lding is	ion R 03 ga ame about
Average fuel o Buildings 6, 8 Size so the	il consumption =	208,814 go 4 years pproximatel each bui	Consumpt  il = 52,2  y the s  lding is	ion R 03 ga ame about

Energy Savings:

TOTAL USE FOR ALL BLOGS :

Fin temperature data were used to calculate the potential energy savings when the indoor temperature is reduced from 68 of to 55 of.

2413 x 3 =

7239 mBth/yr

From the spreadsheet calculations the sum of the (indoor temperature) x hours of occurrence for 68°F is: 153,752 degree hours per year

This value corresponds to the total current energy use.

15-2

	BUBJECT Modular LEAD DESIGNER WTT	Offices	AEP NO
NOLDS, SMITH AND HILLS	LEAD	•	SHEET 3
HITECTS • ENGINEERS • PLANNERS INCORPORATED	CHECKER		DATE
The degree hour	s for 55°F in	door temperat	thre is -
	82,338 clegr	es hours	
Energy savings =	153,572 deg h	rs - 82,338 leg -3,572 deg hrs	krs = 6.46
Energy Savings =	2413 MBtn x	0.46 = 1110 ME	stu ea.for bldgs. 8 t
Additional Energy	Savi Use = the	ings for bldg. Gallove value since	s will be 50% of half the bldg. is office
To maintain o	Hice temperatu	re an electr	ic a/c and
To maintain o heating unit w	ill be utilized	l. It's energy	, use is:
PEUALT			
Vwall =	air film 1/3" hardboard 3" air space 1/3" Navd board	$   \begin{array}{rcl}                                     $	L 1989 ASHRAE
	air film	R = 0.68	Fund.
	= 0.41 Btu/hr.fd	No. 100 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ESHRAE Fundamentals)
1.	air film	R = 0.76	7 from 1989
Oceiling	1/2" Acc. Tile	R = 1.25	ASHRAE Fund.
	air Film	R= 0.76 R= 2.77	

Btn/c.ft2.of

= 0.36

Uceiling =

LEYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
18	CORPORAT	ED	

BURJECT	Modular Offices	AEP NO
	LEAD	
DESIGNER	WTT	DATE
CHECKER		DATE

Wall area = 
$$Aw = (10' \times 8' + 12' \times 8') \times 2 = 352 \text{ ft}^2 - Aw$$

Window area = 
$$Aw$$
: =  $3' \times 3' \times 6 = 54Ft^2$ 

Heating hours = 1,465 hours/year (From bin data)

Cooling hours = 9 "/day × 260 day - 1465 hyr = 875 hr/yr

Cooling efficiency: assume an EER of 8 watt

Cooling energy = 1124 Btm/r + 1500W x 3,413 Btm/r (appliance & ) = 6224 Btm W. Bl

Cooling encry = 6244 Bby = 8 Btm x 1 KW x 875 hr = 683! Kwh/yr. 6149

REYNOLDS,	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
IN.	CORPORAT	ED	

BUBJECT Modular Offices LEAD	
DESIGNER WTT	
CHECKER	DATE

Energy Cost Savings =

Net Energy Cost Savings =

Net energy cost savings = 
$$$\frac{$5528/$r}{$} * 2.5 Bldqs. - $\frac{$216/$gr}{$} = $\frac{$13,600/$yr}{$}$$

REYNOLDS,	SMITH	AND	HILLS
	NCORPORATI		

LEAD	SHEET 6 OF
DESIGNER WTT	DATE
CUECKED	BATE

Project Cost:

Total Project Cost = \$\frac{1}{26,037}\$

See Cost estimate sheets for details

Simple Payback:

Poybock = Cost = Savings = #26,037 = #13,600/yr Payback = 1,9 years

QRIP Calcis

Present energy use = 7239 mBtn/yr #2 fuel oil
cost = 7239 x 4,98 = #36,100/yr

Proposed method = 4464 mBtn/yr #2 fuel oil
20 MBtn/yr electricity

cost = 4,464 x 4,98 + 20 x 10.94
= #22,500

## ENERGY AUDIT OF INDUSTRIAL FACILITIES LETTERKENNY ARMY DEPOT

Operation hours per Operation days per		24 7
Indoor Air Tempera	ture (F) =	55
Hour Fractions:	1 AM - 9 AM 9 AM - 5 PM 5 PM - 1 AM	1 1 1

Temper	ature	Hour s		rrence	Net	Delta	Total	Net
Ran	ge	2-9	10-17	18-1	Hours	T	Deg Hrs	Deg Hrs
70	74	247	237	301	785	-17	0	0
65	69	296	217	278	791	-12	0	0
60	64	269	196	236	701	-7	O	0
55	59	249	191	209	649	-2	0	0
50	54	221	193	202	616	3	1,848	1,848
45	49	218	193	206	617	8	4,936	4,936
40	44	237	236	239	712	13	9,256	9,256
35	39	289	246	286	821	18	14,778	14,778
30	34	304	194	258	756	23	17,388	17,388
25	29	184	106	152	442	28	12,376	12,376
20	24	124	65	90	279	33	9,207	9,207
15	19	75	32	57	164	38	6,232	6,232
10	14	54	13	26	93	43	3,999	3,999
5	9	18	3	9	30	48	1,440	1,440
0	4	9	0	2	11	53	583	583
-5	-1	3	0	1	4	58	232	232
-10	-6	1	0	0	1	63	63	63
-15	-11	o	0	0	0	68	0	0
Tot	als	2798	2122	2552	7472		82338	82338

Total operation hours while heating corrected for working days/week = 4546 Hours/Yr

Total degree hours per year corrected for working days per week = 82338 Degree hours

Average outdoor temperature while heating = 36.9 F

## ECO Construction Cost Estimate Calculations

ECO Name: Modular Offices For Buildings 6-South, 8 and 9

ECO #: 15

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$14,385 \$1,080
Subtotal bare costs FICA Insurance (20% of Labor) Sales Tax (6.5% of Material)	\$15,465 \$216 \$935
Subtotal Overhead (15%)	\$16,616 \$2,492
Subtotal Profit (10%)	\$19,108 \$1,911
Subtotal Bond (1%)	\$21,019 \$210
Subtotal Contingency (10%)	\$21,229 \$2,123
Subtotal (Construction Cost Input For LCCID *)	\$23,352
SIOH (5.5% of Construction Cost)	\$1,284
Subtotal Design (6% of Construction Cost)	\$24,636 \$1,401
Total Project Cost	\$26,037

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

1				0477 8858485			
CONSTRUCTION COST	TE		DATE PREPARED, 4/19/91 SHEET OF			OF	
ENERGY ENGINEERING	ΔΝΔΙ VS			BASIS FOR ESTIMATE			
LOCATION				CODE A (No deals			
LetterKenny Arn	ny De	pot				OE & (Preliminary CODE C (Final de	
REYNOLDS, SMITH AND	.P I	NC.		HER (Specity)			
DRAWING NO.			ATOR			CHECKED BY	
			W.	T. Todd			¥********
Modular Office SUMMARY	QUANT	UNIT	PER	LABOR	PER	ATERIAL	TOTAL
	UNITS	MEAS.		TOTAL	UNIT	TOTAL	COST
ET-120 10'x12' in							
plant office	_3	Ea	160	480	4395	13185	
Shipping from Florida Electric wiving	3	Ea	_		250	750	
Electric wiving	3	Ea	200	600	150	450	
d							-
Subtotal				1080		14,385	#15,465
						-17,-00	75,705
			-				
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						-	
		-					
				1	- 1	1	

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EETCO, Tnc. P.O. Box 10432 Jacksonville, FL 32247-0432 (904) 791-9042 Fax: (904) 358-3906

Date Order = .. Cuote = <u>...</u> 279-2281 BILL Cust Contact: Phone Number: Customer PC: THE ACRICAT: Salesman: Biil 70: REYNOLDS, SMITH & HALL BILL TOOD FL, 32216 Sortwood T 6737 Ship To:

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Dan Caswell				:¢	
-	GETCO, INC.	GETCC			Gelivery Charges
se Equipment sice	New and Uned Warehouse Equipment Sales and Sarrice	Nega Nega		Vendery	HLOW SWKS M. K. U. VELAENY
			 		000
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* #555.a		6 4169.00 I		(300 )	1- Hairchit BREAKER 1300
	•			FIXTURES	1-4706 Galloscent FIXTURES
				4WT SWITCH	1-220 Vouriers, 1-LIGHTSWARCH
s u-	•			217ETS,	1-HIMC UNIT 4-1101 ONTLETS
-				Jouns,	1-5TD. DOOR, 6-WINDOWS
					WITH THE FOLLOWING
<b>6.19</b>				NETE	OFFICE BULDING CONFLETE
				U-P. 4UT	EA. ET-120 10 x12 12-PLANT
0 . 1 	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Total Cisc. Cost	13 13 15 13 15 13	iv Cap. Herght	Gty, Unit   Stock = Description

1780 W. Beaver St. Jacksonville, Florida 32209

P.O. Box 10432 Jectaonville, Florida 32247-0432 rand: 791-9042

## ENERGY AUDIT OF INDUSTRIAL FACILITIES LETTERKENNY ARMY DEPOT

Operation hours per Operation days per w		2 <b>4</b> 7
Indoor Air Temperatu	re (F) =	60
Hour Fractions:	1 AM - 9 AM 9 AM - 5 PM 5 PM - 1 AM	1 1 1

Tempera Rang		Hours 2-9	of Occur 10-17	rrence 18-1	Net Hours	Delta T	Total Deg Hrs	Net Deg Hrs
70	74	247	237	301	785	-12	0	0
65	69	296	217	278	791	-7	0	0
60	64	269	196	236	701	-2	0	0
55	59	249	191	209	649	3	1,947	1,947
50	54	221	193	202	616	8	4,928	4,928
45	49	218	193	206	617	13	8,021	8,021
40	44	237	236	239	712	18	12,816	12,816
35	39	289	246	286	821	23	18,883	18,883
30	34	304	194	258	756	28	21,168	21,168
25	29	184	106	152	442	33	14,586	14,586
20	24	124	65	90	279	38	10,602	10,602
15	19	<i>7</i> 5	32	57	164	43	7,052	7,052
10	14	54	13	26	93	48	4,464	4,464
5	9	18	3	9	30	53	1,590	1,590
0	4	9	0	2	11	58	638	638
-5	-1	3	0	1	4	63	252	252
-10	-6	1	0	0	1	68	68	88
-15	-11	0	0	0	0	73	0	0
Tota	als	2798	2122	2552	7472	<b></b>	107015	107015

Total operation hours while heating corrected for working days/week = 5195 Hours/Yr

Total degree hours per year corrected for working days per week = 107015 Degree hours

Average outdoor temperature while heating = 39.4 F

## ENERGY AUDIT OF INDUSTRIAL FACILITIES LETTERKENNY ARMY DEPOT

Operation hours per Operation days per		2 <b>4</b> 7
Indoor Air Temperat	ure (F) =	68
Hour Fractions:	1 AM - 9 AM . 9 AM - 5 PM 5 PM - 1 AM	1 1 1

Temper Ran		Hours 2-9	of Occur 10-17	rrence 18-1	Net Hours	Delta T	Total Deg Hrs	Net Deg Hrs
70	74	247	237	301	785	-4	0	0
65	69	296	217	278	791	1	791	791
60	64	269	196	236	701	6	4,206	4,206
55	59	249	191	209	649	11	7,139	7,139
50	54	221	193	202	616	16	9,856	9,856
45	49	218	193	206	617	21	12,957	12,957
40	44	237	236	239	712	26	18,512	18,512
35	39	289	246	286	821	31	25,451	25,451
30	34	304	194	258	756	36	27,216	27,216
25	29	184	106	152	442	41	18,122	18,122
20	24	124	65	90	279	46	12,834	12,834
15	19	75	32	57	164	51	8,364	8,364
10	14	54	13	26	93	56	5,208	5,208
5	9	18	3	9	30	61	1,830	1,830
0	4	9	0	2	11	66	726	726
-5	-1	3	0	1	4	71	284	284
-10	-6	1	0	0	1	76	76	76
-15	-11	0	0	0	0	81	0	0
Tot	als	2798	2122	2552	7472		153572	153572

Total operation hours while heating corrected for working days/week = 6687 Hours/Yr

Total degree hours per year corrected for working days per week = 153572 Degree hours

Average outdoor temperature while heating = 45.0 F

## ENERGY AUDIT OF INDUSTRIAL FACILITIES LETTERKENNY ARMY DEPOT

Operation hours per Operation days per	day = week =	8 5
Indoor Air Temperatu	ıre (F) =	68
Hour Fractions:	1 AM - 9 AM 9 AM - 5 PM 5 PM - 1 AM	0.25 0.75 0

Tempera Rang		Hours 2-9	of Occu 10-17	rrence 18-1	Net Hours	Delta T	Total Deg Hrs	Net Deg Hrs
70	74	247	237	301	240	-4	0	0
65	69	296	217	278	237	1	791	237
60	64	269	196	236	214	6	4,206	1,286
55	59	249	191	209	206	11	7,139	2,261
50	54	221	193	202	200	16	9,856	3,200
45	49	218	193	206	199	21	12,957	4,184
40	44	237	236	239	236	26	18,512	6,143
35	3 <b>9</b>	289	246	286	257	31	25,451	7,959
30	34	304	194	258	222	36	27,216	7,974
25	29	184	106	152	126	41	18,122	5,146
20	24	124	65	90	80	46	12,834	3,669
15	19	<i>7</i> 5	32	57	43	51	8,364	2,180
10	14	54	13	26	23	56	5,208	1,302
5	9	18	3	9	7	61	1,830	412
0	4	9	0	2	2	66	726	149
-5	-1	3	0	1	1	71	284	53
-10	-6	1	0	0	0	76	76	19
-15	-11	0	0	0	0	81	0	0
Tota	als	2798	2122	2552	2291		153572	46172

Total operation hours while heating corrected for working days/week = 1465 Hours/Yr

Total degree hours per year corrected for working days per week = 32980 Degree hours

Average outdoor temperature while heating = 45.0 F

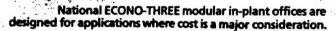
#### LETTERKENNY ARMY DEPOT FUEL CONSUMPTION REPORT IN GALLONS

BLDG	YEAR	OCT	NOV	DEC	Jan	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEARLY TOTAL	
** BOILE	R LOCAT	ION: BU	ILDING	1	SERV	ES BUILD	INGS: 1,	2						FUEL TYPE: 5	
1	FY87	4545	2640	728	2810	3401	6278	10899	6000	17985	2112	3989	8052	69439	
1 .	_ FY88	0	21786	9197	4575	16052	4647	10351	225	2472	0	0	0	69305	
1	FY89	294	5623	9885	2697	16802	3138	10534	706	91	1321	1027	4165	56283	
1	FY90	6864	10838	851	8832	15574	2377	-1	4007	0	1386	378	0	51106	
** BOILE	R LOCAT	ION: BU	ILDING	2	SERV	ES BUILD	INGS: 4,	7						FUEL TYPE: 2	
2	FY87	896	732	4206	9777	9384	8246	2710	2636	3836	3636	2916	190	49165	
2	FY88	8018	943	10711	12793	27167	15963	12033	8226	4936	21796	4113	1233	127932	_
2	FY89	2112	6053	602	2783	11941	1044	10607	1107	0	0	0	0	36249	
2	FY90	5131	14811	17118	20647	4276	4882	2137	0	0	1220	4410	0	74632	
** BOILE	r locati	ION: BU	ILDING	3	SERV	ES BUILD	IN6S: 3,	5						FUEL TYPE: 5	
3	FY87	756	6275	908	6695	15	1361	1931	2617	4275	8198	15139	5951	54121	
3	FY88	3368	6455	13284	11511	3649	7043	4445	6164	392	0	0	0	56311	
3	FY89	0	12449	4999	4672	17211	5886	2140	1230	0	179	228	1266	50260	
3	FY90	3787	1852	2154	7188	11293	4493	-1	0	0	0	0	0	30766	*
## BOILER			ILDING	8		ES BUILD		8, 9						FUEL TYPE: 2	
8	FY87	1088	7035	13054	16931	13780	9278	9475	163	0	0	123	551	71478	
. 8	FY88	0	8435	10865	1249	24192	0	4246	77	0	3544	3534	7465	63607	
8	FY89	9612	4042	2798	4808	446	4719	336	522	0	0	0	0	27283	
8	FY90	3614	8846	9613	11906	7665	1679	3123	0	0	0	0	0	46446	
** BOILER			ILDING	10		ES BUILD								FUEL TYPE: 2	;
10	FY87	254	66	77	. 96	129	65	106	83	0	356	250	0	1482	
10	FY88	530	1177	4509	3631	2993	3240	637	619	0	206	121	58	17721	
10	FY89	103	1982	3918	4290	2413	2534	910	215	0	300	2703	500	19868	
10	FY90	0	1315	4433	4942	2225	789	0	0	0	0	0	0	13704	
** BOILER	R LOCATI	ON: BU	ILDING	12	SERVI	ES BUILD	INGS: 12	, 13, 14	}					FUEL TYPE: 5	
12	FY87	1794	1732	833	2938	4103	2987	961	31	62	4	92	184	15721	
12	FY88	369	2414	3949	4405	3537	2370	1547	131	0	0	0	0	18722	10
12	FY89	800	2507	4263	2818	3824	2596	789	269	0	0	0	0	17866	
12	FY90	675	3428	2929	1432	2430	3067	521	0	0	0	0	0	14482	
## BOILER				37HP	SERVE		INGS: 37							FUEL TYPE: 2	
37HP	FY87	3506	3583	2147	8008	4366	3582	3763	4823	1153	5113	3037	5424	46505	EN
37HP	FY88	4633	4840	5453	6893	6583	7643	2435	5611	6266	7803	2280	6856	67296	000
37HP	FY89	2625	5712	6551	6816	8100	5837	5824	1110	1108	3660	6957	3379	57679	
37HP	FY90	5486	9712	5367	4934	5666	9263	8553	1012	0	0	0	0	49993	
** BOILER				37N			NGS: 37	_						FUEL TYPE: 5	
37N	FY87	101	1477	4097	4079	4300	3586	1307	155	0	0	40	40	19182	1
37N	FY88	731	3099	1571	2750	10474	4706	4820	156	312	624	1248	960	31451	- ·
37N	FY89	1920	1951	265	3412	4256	3531	1084	123	0	0	0	0	16543	
JN	FY90	1553	5008	7038	1798	2996	5695	1079	0	0	0	0	0	25167	

1-15



## ECONO-THREE OFFICES



Although low in price, these attractive enclosures offer full 3" thick, 3-ply wall panels constructed of %" 4 mil vinyl-clad hardboard (each side) over a kraft honeycomb core. All panels are completely interchangeable and reuseable.

Features include pre-hung, pre-finished oak woodgrain doors, pre-painted steel-ribbed roof deck

and one-piece mill-finished extruded aluminum connection and corner posts allowing fast on-site assembly.

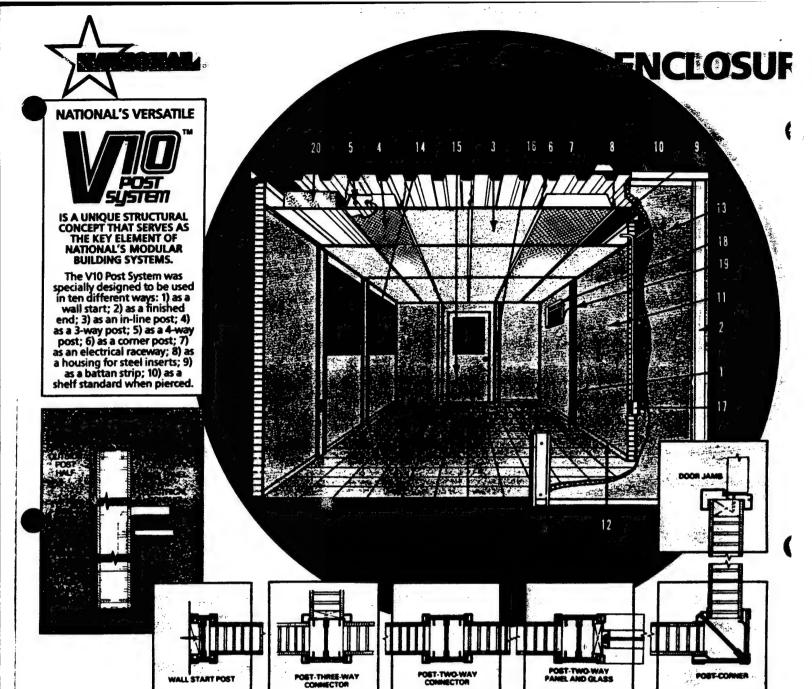
System incorporates all of National's quality features including exclusive "Wire-Pak" modular snap-together, sixwire wiring system. Offices are also available in vision tower and two-story versions.

#### SEE PAGES 16 THROUGH 19 FOR CONSTRUCTION DETAILS.

SEE PAGE 26 FOR ARCHITECTURAL SPECIFICATIONS.



		MODEL SELE	CTION CHART		
get in the research					
ET64	8x8	958	ET320	16x20	2734
ET80	8x10	1012	ET336	12x28	2966
ET96	8x12	1246	ET384	12x32	3310
ET100	10x10	1260	ET388	16x24	3148
ET120	10x12	1418	ET400	20x20	3190
ET144	12x12	1590	ET448	16x28	3534
ET160	10x16	1734	ET480	20x24	3646
ET192	12x16	1934	ET512	16x32	3934
ET200	10x20	2050	ET560	20x28	4102
ET240	12x20	2278	ET640	20x32	4558
ET256	16x16	2334	ET720	20x36	5014
ET288	12x24	2622	ET800	20x40	5470

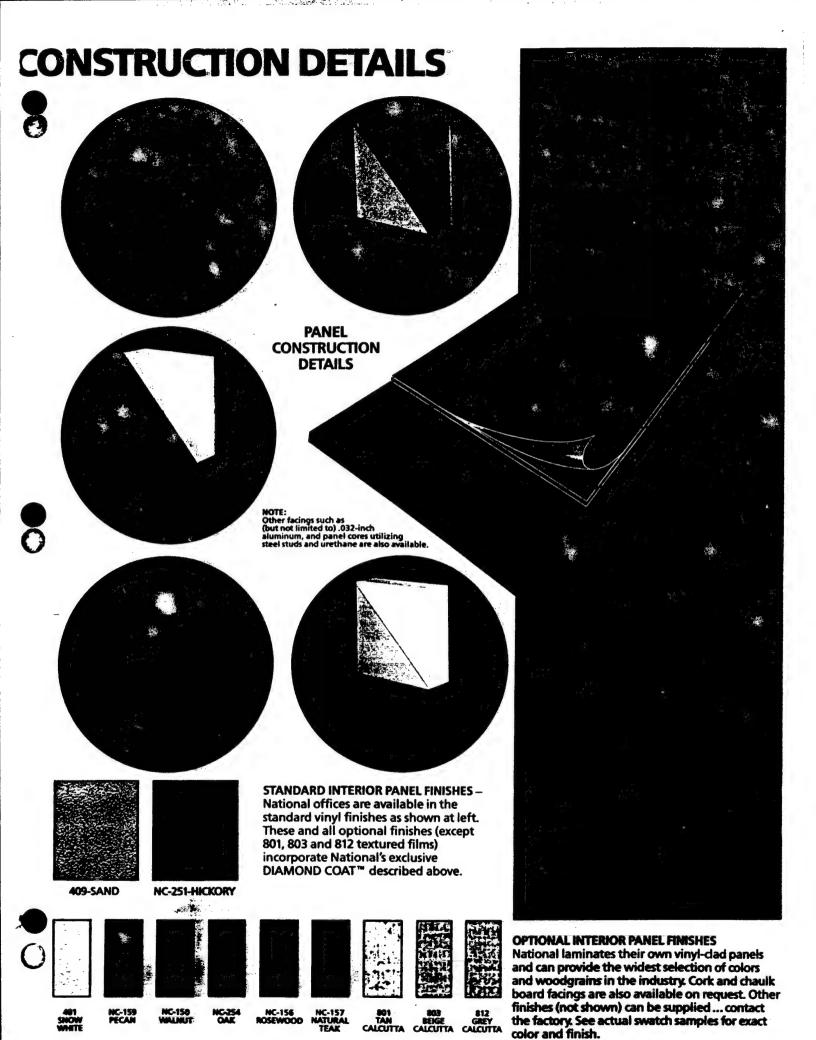


- POSTS: Extruded anodized aluminum with spring-held vinyl-clad feature strips to match interior/exterior panel facings (see V10™ information above).
- CORNER POSTS: Massive two-piece anodized aluminum with matching vinyl-clad feature strips assure fastest possible assembly of corners.
- CEILING: Attractive, white, random fissured, vinyl-faced fiberglass tile, easily cleaned to retain permanent beauty.
- INDIRECT LIGHTING: Luminous fixture panels, as required, provide efficient, soft overall lighting without dark areas.
- CONCEALED LIGHTS: Fluorescent, four-tube, lay-in troffer-type fixtures. Average 100 foot candles of illumination.
- TIE WIRES: Fasten to roof deck with selftapping screws and to ceiling grid main T's.
   ROOF DECK: Designed to achieve optimum structural efficiency in 22 gauge steel (painted), provides clear spans up to 12 feet (20 feet with 6-inch joists).
- ROOF DECK END CLOSURES: Rubber seals inserted in roof flutes contain heat and conditioned air. Insures dust-free interior.

- CEILING GRID: White enameled "T" support system forms a rigid frame for light fixtures and ceiling tiles.
- PANEL CAPS: Anodized aluminum panel caps incorporating fascia provide finishing touch to panels as seen from exterior.
- 11. WALLS: A full 3-inch thick with honeycomb core affords structural rigidity and effective "Sound Conditioning." Yie" tempered hardboard facings, clad in choice of "DIAMOND-COAT" vinyl colors and finishes, retain beauty with minimum maintenance.
- CONTINUOUS BASE CHANNEL: Heavy anodized aluminum base channel (fastened to floor) supports and secures wall panels. Trims bottom on interior and exterior.
- REMOVABLE PANELS: Special design feature of panels allows easy removal providing access for large equipment, or replacement of damaged panels, without dismantling enclosure.
- WINDOWS: Optional choice of picture, sliding or pass-thru (with or without shelf).
   All provided with tempered safety glass.
- 15. DOORS: Attractively faced in harmonizing vinyl. Pre-hung in aluminum jamb, complete

- with hardware, solid 20-inch by 30-inch door lite, and/or with 18-inch by 12-inch anodized aluminum grille are optional.
- WALL SWITCH: Light switches are conveniently placed and attractive, conforming to National Code.
- 17. WALL OUTLETS: Conduit run with junction box, outlet or switch, cover plate offset fitting, conduit to reach ceiling plenum and connectors. All pre-assembled in interior posts to create vertical electric raceway.
- COMFORT CONTROL OPTIONS: Include air conditioners (from 5,000 BTU to 12,000 BTU); 8-inch exhaust fan (wall-mounted), 180 CFM; heater up to 5,600 watts (Heat, off or fan) wall-mounted; anodized aluminum louver 12-inch by 18-inch.
- AIR CONDITIONER OUTLET: 110 or 220 volt. (Breaker panel provided with the office kit allows separate circuit for air conditioner operation.)
- 20. ENERGY-SAVER CONSTRUCTION (Optional): Includes wall panels constructed of ¾-inch winyl-clad facings (each side) with an including polystyrene foam core (1 lb. density) and a 6-inch thick fiberglass blanket of insulation layed into the plenum area. Provides R-12 well and R-19 roof rating.

SEE PAGE 26 FOR ENGINEERING AND ARCHITECTURAL SPECIFICATIONS



OSD PIF

SOCIEMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS		1, PROJECT NO.		requirement control symbol	DINTROL SYMBOL
For use of this form, see AR 6-4; the proponent agency is OCA.	DCA.	AMC OSD PIF		DD-M(R) 1561	1) 1561
		Commander		6. DOD COMP NAME Army	6. DOD COMP CODE A
on: DACS-	Ar 22303-0001	US DESCOM Attn: AMSDS-RM-P Chambersburg, PA 17201-417		7. COMMAND CODE ) W730KK	8. DATE 10/9/21
ngton, UL 2031U-2010 Frite	10. TYPE OF PROJECT (Check one)		11. AMORTIZATION YEARS/MONTH	RS/MONTHS	
Dip Tank Covers and Exhaust Fan Controls	ONIC	•	\$210,257	+ 137.400	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cost)	(Average Annual 3	erbeet (Na May
024	15		1.5 or (yeary)	(months) (emos	(amortisation)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION	TION			
Commander Letterkenny Army Depot Attn: SDSLE-EM (T. Hagie)	Covers for d reduced to p	Covers for dip tanks that will reduced to provide reduced air	allow the exhaust flow requirements.		fan speed to be
Bidg. bb3 Chambersburg, PA 17201-415D					
Covering the dip tanks will reduce the v	/entilation ain	the ventilation air flow requirements.		The reduced air flow will save	will save
energy.					
19. SAVINGS DISPOSITION					
Savings are used to reduce energy expe	expenditures				
20. OTHER REMARKS (Continue on page 6, if more space is needed)					

4				SUMM. (ROUND O	SUMMARY OF BOLLAR SAVINGS (ROUND OFF TO THE NEAREST BOLLAR)	T DOLLAR)				•
			Attec	tiach computation sheet identifying the method and source of data for savings	entifying the method	and source of data for	sarings			
	SAVINGS	PRESENT		PROPOSED METHOD	МЕТНОО			DIFFERENCE/SAVINGS	E/SAVINGS	
- 3 5	BREAKOUT ALARY/LABOR/ VENTIME	METHOD	18T Y.R.	2D VA	30 VR	ATH VR	18T YR	2D VR	30 YR	4TH YR
LATERIA	ATERIAL/ UPPLIES									
Ē	TILITIES									
EPAIR	AINTEMANCE/ EPAIR									
4	NANSPORTATION	•								
3	EASE COSTS									
ALVAGI	ALVAGE/ URN-IN									
Ele	NERGY (Identity) Electricity	\$209,500	\$72,100	\$72,100	\$72,100	\$72,100	\$137,400	\$137,400	\$137,400	\$137,400
E S	AND #0 TUE!									
E	THER (Identity)									
	TOTALS	\$209,500	\$72,100	\$72,100	\$72,100	\$72,100	\$137,400	\$137,400	\$137,400	\$137,400
					PRIORITIZATION					
=	INTERNAL RAT Divide estimate Based on facto	INTERNAL NATE OF RETURN (IRR)  Divide estimated project cost $\frac{$209,500}{$}$ by average annual savings $137,400$ 1.5 factor.  Based on factor and number of years economic life of the project, select the IRR from Table H-3, App H, Ch. 5, AR 6-4 -	500 by evera	iverage annual savings	137,400 he IRR from Table	1. 5 t		110. SIRR.	쓞	
12	SAVINGS TO INVESTMEN Multiply annual sevings.	Multiply annual earlings 137, 400	X discount factor		1,096,5	1,096,500 and divide by present value of investment	ment value of in	retment		
	(Based on economic life	210,23/ sie life 15	years, select disc.	discount factor from Table H-4, App H, Ch. 5, AR 5-4.	de H-4, App H, Ch.	6, AR 6-4.				
5	MATE OF INVE	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	N SPACE (RIMS)	N/A						
	Delos senmas (Menpower req	Divide estimated project cost	d in this compute	by number of manpower space savings_ putation.)	space savings	•		RIMB.	?	

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				) 1
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	APPROPRIATION, FY BUDGET ACTIVITY RE	FY FUNDS
•	•	3	70		,	-
w Dip Tank Covers	1	\$1,404	39	\$54,765		
(8) Exhaust Fan Controls		\$7,775	20	\$155,492		
(3)						
B						
(9)						
(6) TRANSPORTATION (Equipment delbery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT <sup>2</sup>						
(10) FACILITIES MODIFICATION <sup>3</sup>						
(11) TRAINING			18 T			
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONA	DME OPERATIONAL			\$210.257		
(14) TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			\$210,257		(T) (C) (C)
(16) TOTAL AMOUNT OF FUNDING REQUIR	UNDING REQUIRED FROM OTHER SOURCE			1		
(16) TOTAL (8um of (14) + (15) abour)	(16) aboue)			\$210,257		
In a Carlo and sacramental and second and a last	amierit					

INOT to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

<sup>3</sup>Normally not OPA funded

Used to compute amoritration in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

ដ			s	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	INGS (MANPOWER	AND DOLLARS)				
			SAVINGS				REAPPLICATION OF SAVINGS	OF SAVINGS		
	ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA	TDA PARA AND LINE	FUNCTION CODE	N CODE
	•	•	٠	•	e. FROM	f TO	g. FROM	А. ТО	L FROM	, 10
3	REGULIREMENTS AND AUTHORIZATIONS ELIMINATED									
ê	REGUIREMENTS ONLY ELIMINATED									
6	BORROWED MILITARY MANPOWER RELEASED									
€	OVERHIRES OR TEMPORARIES TERMINATED									
3	HOURS OVERTIME ELIMINATED									
€	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
3	OTHER DOLLAR SAVINGS (Excluding Manpower), e.g., CONTRACT COSTS & UTILITIES									
3	Electricity			\$27,300			•			
3	#6 Fuel Oil			\$114,800						
(01)	» Cover Replacements			(\$4,700)						
î	TOTAL DOLLAR SAVINGS			\$137,400						
<b>v</b>	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlared	Reflect specific duties bet	duits king po	ng perjormed with additional manhows available (equivalent manyears)	mel menhours eveile	ble fequinelens ma	yeary		ć	

DATE (YYMMDD) DATE (YYMMDD) DATE (YYMNDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON [Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) POR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE A OTHER COORDINATION (Functional Coordination of local lawl, e.g., Fee Eng. Log. Priz. etc.) 28. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Praised Initiatory 26. APPROVAL RECOMMENDED BY (MACOM/Agency) 29. OTHER REMARKS (Cont'd) 27. APPROVED BY

ECO Number: 3

#### DIP TANK COVERS WITH EXHAUST FAN CONTROLS

#### Discussion

Noxious dip tank fumes are exhausted in accordance with OSHA guidelines to protect workers. Ventilation of the fumes is accomplished by drawing room air across the surface of the dip tank fluid, into an exhaust duct, through a ventilation fan and out through the roof to the atmosphere. The warm room air used to entrain the fumes must be replaced with outside air that must be heated. The exhausted air represents a significant heat loss.

The amount of exhausted air can be minimized by covering the dip tank and draft slot with a flexible, chemically resistant cover whenever the tank is not in use. With the cover in place, the fume evolution potential is sharply reduced, so the amount of exhaust air can also be reduced. The reduction in exhaust air represents substantial energy savings from both reduced warm air loss as well as from reduced exhaust fan power.

This ECO provides all vented dip tanks with a flexible, chemically resistant cover (like a tarpaulin) permanently fixed to each tank/vent-duct assembly. The cover can be extended or retracted by appropriate means ranging from manually rolling and unrolling to spring-assisted retraction, similar to the operation of a window shade (see Volume II for sketches). This ECO also provides for exhaust fan speed reduction whenever the covers are in place. The speed reduction will be accomplished by measuring and controlling a set pressure rise across the exhaust fan with a differential pressure sensor and controller which in turn will adjust the speed of the exhaust fan motor through a variable frequency drive. This fan speed control will be particularly effective in Buildings 1 and 370 where fans serve multiple tanks. With this control technique, the OSHA-mandated exhaust air flows can be maintained under all conditions of variable building pressure and variable tank use.

This approach to dip tank operation has been discussed with OSHA in Harrisburg, Pennsylvania, and determined to be acceptable.

#### Recommendation

Based on the Life Cycle Cost Analysis and a discussion with OSHA, it is recommended that flexible, chemically resistant dip tank covers be installed along with vent fan pressure differential controllers on the 29 vented dip tanks as noted in the Appendix.

Construction Cost	\$188,590
Annual Energy Savings (MBtu/yr)	
Nos. 5 & 6 Oil	26,034
Electricity	2,496
Annual Energy Cost Savings (\$/yr)	\$142,100
Additional Maintenance	\$4,700
SIR	10.0
Simple Payback (years)	1.5

```
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)
                                                         LCCID 1.062
 INSTALLATION & LOCATION: LETTERKENNY ADREGION NOS. 3 CENSUS: 1
PROJECT NO. & TITLE: ECO #3
                             DIP TANK COVERS
FISCAL YEAR 1992
                   DISCRETE PORTION NAME: TOTAL PROJECT
ANALYSIS DATE: 10-21-91 ECONOMIC LIFE 15 YEARS PREPARED BY: W. TODD
1. INVESTMENT
    A. CONSTRUCTION COST
                                                               $
                                                                   188570.
    B. STOH
                                                               $
                                                                    10372.
    C. DESIGN COST
                                                               $
                                                                    11315.
    D. SALVAGE VALUE COST
                                                                        0.
    E. TOTAL INVESTMENT (1A + 1B + 1C - 1D)
                                                                   210257.
2. ENERGY SAVINGS (+) / COST (-)
    ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS
             UNIT COST
                         SAVINGS
                                      ANNUAL $
                                                   DISCOUNT
                                                               DISCOUNTED
    FUEL
             $/MBTU(1)
                         MBTU/YR(2)
                                      SAVINGS(3)
                                                   FACTOR(4)
                                                               SAVINGS(5)
    A. ELECT $ 10.94
                           2496.
                                          27306.
                                                       10.75
                                                                   293542.
    B. DIST $ 4.98
                                                      14.08
                              0.
                                              0.
                                                                        0.
                          26034.
    C. RESID $ 4.41
                                                      16.21
                                      $ 114810.
                                                                  1861069.
    D. NAT G $
                 .00
                              0.
                                      $
                                              0.
                                                      13.25
                                                                        0.
    E. COAL $
                 .00
                              0.
                                              0.
                                                      11.13
                                                                        0.
    F. TOTAL
                          28530. $ 142116.
                                                           $ 2154611.

 NON ENERGY SAVINGS(+) / COST(-)

   A. ANNUAL RECURRING (+/-)
                                                                    -4700.
       (1) DISCOUNT FACTOR (TABLE A)
                                                      10.59
       (2) DISCOUNTED SAVING/COST (3A X 3A1)
                                                                   -49773.
   C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)$
                                                                  -49773.
   D. PROJECT NON ENERGY QUALIFICATION TEST
       (1) 25% MAX NON ENERGY CALC (2F5 X .33)
                                                        711022.
            A IF 3D1 IS = OR > 3C GO TO ITEM 4
B IF 3D1 IS < 3C CALC SIR = (2F5+3D1)/1F)_____
            C IF 3D1B IS = > 1 GO TO ITEM 4
            D IF 3D1B IS < 1 PROJECT DOES NOT QUALIFY
4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1D/(YRS ECONOMIC LIFE))$ 137416.
5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C)
                                                              $ 2104838.
6. DISCOUNTED SAVINGS RATIO
                                       (SIR)=(5 / 1F)= 10.01
    (IF < 1 PROJECT DOES NOT QUALIFY)
7. SIMPLE PAYBACK PERIOD (ESTIMATED) SPB=1F/4
                                                          1.53
```

LIFE CYCLE COST ANALYSIS SUMMARY

STUDY: ECO3

		TERKENNY		_			
		E(0#3		SHEET		OF	4
HSH.	DESIGNER 6	S.E.		DATE_	3-21	-91	
	CHECKER	(274)		DATE_			
	Checken	9					
ECO#3 D	SID TANK	COUPES					· .
20 4 3 5	ALD THEIR	<u> </u>	i : .				
The second of th	The second section of the second second section of the second secon	A STATE OF THE PARTY OF THE PAR			i		
ASSUMPTIONS:	and the same and the same of t						
1. ROAM TE	MPERAT	URE =	68-2	<del></del>	1		1
2. HEAT LO	AD FACTOR	2 (HLE)			1	-	
HLF,	= 0.166 m	STUL SYNOFM	(24h/d	1,7d/u	<u> </u>	1 1	
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TOTAL	EACIL	ITY EL	ECE	ener	Garfin	SAY	EO	= 2	≥	LNU	LV.	צעט	16	HV
TOTAL	FACIL	ity El	ECE	ENER	6.4	SAV				! !				+-
TOTAL	FACIL	ity EL	ECE	ENER	6-/	SAV				! !				+-
T04%	FACIL	:	ECE	ENER	6-/	SAV				! !			74 4	+-
TOTAL	FACIL	17 50	ECE	ZUZR	<b>6-7</b>	SAV				! !			77	R.
LOAN	FACIL	:	ECE	ENER	· · · · · · · · · · · · · · · · · · ·	SAV				! !			77	+-
TOTAL	FACIL	:	ECE	SCIER	6.7	SAV				! !			77	R.
TOTAL	FACIL	:	ECE	SCIER	6.7	<i>SAV</i>				! !			77	R.
TOTAL	FACIL	:	ECE	SUER	6.7	SAV				! !			77	R.
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TOTAL	FACIL	:				SAV				! !			77	R.
TOTAL	FACIL	:				SAV				! !			77	R.

3-4

LETTERKENNY ARMY DEPOT DIP TANK COVER SUMMARY

	Building Number	Tank ID	Ventil.	Common or Dedicated Fan (D)-(C)	FUEL (5&	Saved Energy	Electric Saved	Energy	Cost	Const. Cost#	Payback (Yrs)
				+	+						
	1N	2861-1	10,000	; D	1,137	\$5,014	109	\$1,192	\$6,207	\$9,148	1.5
		2861-2	3,750		426	\$1,880	.41	\$447			0.6
	-	2861-3	7,500		853	\$3,761	82	\$894	\$4,655	\$1,438	0.3
		2861-4	7,500		853	\$3,761	82	\$894	\$4,655	\$1,438	0.3
		2861-5	7,500	; C		\$3,761	82	\$894	\$4,655	\$1,438	0.3
		2861-6	7,500	: D	853	\$3,761	82	\$894	\$4,655	\$9,148	2.0
		2861-7	7,500			\$3,761	82	\$894	\$4,655	\$1,438	0.3
		2861-8	7,500	t C		\$3,761	82	\$894	\$4,655	\$1,438	0.3
		400	3,060	1 C	348	\$1,534	33	\$365	\$1,899	\$1,438	0.8
		402	4,500			\$2,256	49		\$2,793	•	3.3
		378	4,500			\$2,256	49		\$2,793	•	0.5
		377	4,500			\$2,256	49		\$2,793		0.5
		4577	•		177	\$782	17			\$1,438	1.5
	•	4741	4,050	: C:		\$2,031	44	\$483	\$2,514	\$1,438	0.6
Subtotal	1N	14	80,920	3	9,201	\$40,575	882	\$9,649	\$50,224	\$43,262	0.9
	37	2568	6,800	D	773	\$3,410	74	\$811	\$4,221	\$9,148	2.2
		4318	5,200	D	591	\$2,607	57			\$9,148	2.8
		4319	9,600	D	1,092	\$4,814	105	\$1,145		\$9,148	1.5
	_	4193	6,000	D	682	\$3,009	65	\$715	\$3,724	\$9,148	2.5
Subtotal	37	4	27,600	4	3,138	\$13,839	301	\$3,291	\$17,130	\$36,592	2.1
	350N	2514	9,360	D	1,064	\$4,693	102	\$1,116	\$5.809	\$9,148	1.6
		2516	6,480	D	737	\$3,249	71	\$773		•	2.3
		2518	9,360	D	1,064	\$4,693	102	\$1,116	\$5,809	\$9,148	1.6
		2520	12,600	D	1,433	\$6,318	137	\$1,502	\$7,820	\$9,148	1.2
		2744	5,500	D	625	\$2,758	60	\$656	\$3,414	\$9,148	2.7
		1479	3,600	D	409	\$1,805	39	\$429	\$2,234	\$9,148	4.1
		1480	6,860	D	780	\$3,440	75	\$818	\$4,258	\$9,148	2.1
		2606	993	D	113	\$498	11	\$118	\$616	\$9,148	14.8
	350S	2531	12,000	D	1,364	\$6,017	131	\$1,431	\$7,448	\$9,148	1.2
		2536	11,000	D	1,251	\$5,516	120	\$1,312	\$6,827	\$9,148	1.3
	•	2539	2,500	D	284	\$1,254	27	\$298	\$1,552	\$9,148	5.9
Subtotal	350	11	80,253	11	9,125	\$40,240	875	\$9,570	\$49,810	\$100,628	2.0

#### LETTERKENNY ARMY DEPOT DIP TANK COVER

	Building Number	Tank ID	_	Dedi		Annual FUEL (5& 6) Saved (Mbtu)	Energy	Electric Saved	Energy	e Cost Savings	Const.	Payback (Yrs)
	370	T., f	2 000	+	C :	} ! 400	#1 OAE	41	*450	#0 DE0	41 420	۸.
	3/0	T-1 T-2	3,800 2,700		C			41	\$453	•	•	0.6
			•				•	29		•	,	0.9
		1-3	5,700		D		•	62		,	•	2.6
		T-4	5,700		C			62		•	•	0.4
		1-5	3,600		C		•	39	\$429	•	•	0.6
		T-6	2,700	i	C		\$1,354	29	\$322	\$1,676	\$1,438	0.9
				+								
		1-7	5,700		D			62		•	•	2.6
		1-8	3,800		€ :		,	41	\$453	\$2,359	\$1,438	0.6
		1-9	2,700	1	C	307	\$1,354	29	\$322	\$1,676	\$1,438	0.9
		T-10	3,800	¦ -4	C 1	432	\$1,905	41	\$453	\$2,359	\$1,438	0.6
Subtotal	370	10	40,200	<b>V</b>	2	4,571	\$20,157	438	\$4,794	\$24,951	\$29,800	1.2
Total	4	39	228,973		20	26,034	\$114,811	2,496	\$27,304	\$142,115	\$210,282	1.5

Costs for differential pressure controls and VF drives are not distributed over tanks sharing a common fan.

QRIP Cale using FY92 Fuel Oil Prices

Current energy use:

Elec = Fan Hp\* Btn/Hp \* 3760 tr/yr \* 106 MBtn \* 10.94 \$ / MBTN

Fon Hr = cfm Ap

6356 Nfan

= (723,973)(E) \* 2545 Btn \* 8760 \* 10.94 \$ / MEtn = # 52,700/yr.

HpHr 106

Fuel Oil = cfm \* HLF = n 11 = 228,973 x 0,166 = 0.8 = 47,5 12 metaly-

TOTAL COSTS = \$262,200/yr

3-1

# ECO Construction Cost Estimate Calculations

ECO Name: Dip Tank Cover

ECO #: 3

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	<b>\$4,4</b> 00 <b>\$96</b> 0
Subtotal bare costs FICA Insurance (20% of Labor) Sales Tax (6.5% of Material)	\$5,360 \$192 \$286
Subtotal Overhead (15%)	\$5,838 <b>\$8</b> 76
Subtotal Profit (10%)	\$6,714 \$671
Subtotal Bond (1%)	\$7,385 \$74
Subtotal Contingency (10%)	\$7,459 \$746
Subtotal (Construction Cost Input For LCCID *)	\$8,205
SIOH (5.5% of Construction Cost)	\$451
Subtotal Design (6% of Construction Cost)	\$8,656 \$492
Total Project Cost	\$9,148

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

# ECO Construction Cost Estimate Calculations

ECO Name: Dip Tank Covers w/o Controls

ECO #: 3

والمراجع والمراجع والمراجع والمستعمل والمستعمل والمستعمل والماري والمتار والمستعمل والمستعم والمستعم والمستعمل والمستعمل والمستعمل والمستعمل والمستعمل والمستعمل والمستعمل والمس

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$500 \$320
Subtotal bare costs FICA Insurance (20% of Labor) Sales Tax (6.5% of Material)	\$820 \$64 \$33
Subtotal Overhead (15%)	\$917 <b>\$1</b> 38
Subtotal Profit (10%)	\$1,055 \$106
Subtotal Bond (1%)	\$1,161 \$12
Subtotal Contingency (10%)	\$1,173 \$117
Subtotal (Construction Cost Input For LCCID *)	\$1,290
SIOH (5.5% of Construction Cost)	\$71
Subtotal Design (6% of Construction Cost)	\$1,361 \$77
Total Project Cost	\$1,438

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

### ECO Construction Cost Estimate Calculations

ECO Name: Dip Tank Covers

ECO #: 3

1991 ECO "bare" costs (from cost estimate sheet) Material Labor	\$97,500 \$25,280
Subtotal bare costs	\$122,780
FICA Insurance (20% of Labor)	\$5,056
Sales Tax (6.5% of Material)	\$6,338
Subtotal	\$134,174
Overhead (15%)	\$20,126
Subtotal	\$154,300
Profit (10%)	\$15,430
Subtotal Bond (1%)	\$169,730 \$1,697
Subtotal	\$171,427
Contingency (10%)	\$17,143
Subtotal (Construction Cost Input For LCCID *)	\$188,570
SIOH (5.5% of Construction Cost)	\$10,371
Subtotal	\$198,941
Design (6% of Construction Cost)	\$11,314
Total Project Cost	\$210,255

\* The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

For QRIP

Covers represent 26% of project cost => 
$$\frac{31980}{122,180}$$
 = 0.26

Therefore  $210,257 \times 0.26 = \frac{4}{54,765}$ 

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SUBJECT	ECO#3	AEP NO Z	90-0379-001
	- 11 11	SHEET	OF
DESIGNER	P. Hutchin	DATE	
CHECKER		DATE	

Additional maintenance costs

Covers will last about 5 years

Therefore, covers will be replaced & times over the 15 year project life

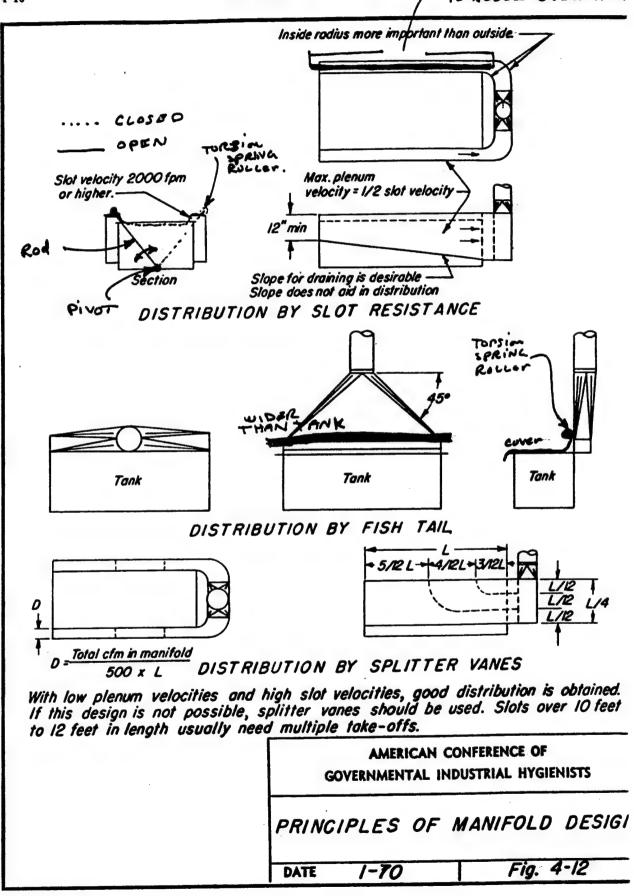
For LCCID 1/5 of 39 covers will be replaced annually

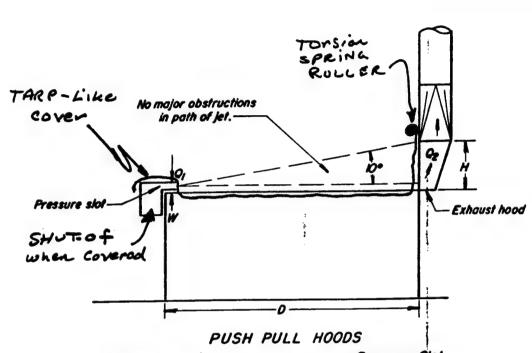
1/5 x \$600 x 39 = \$4700

CONSTRUCTION COST	ESTIMAT	ΓE		DATE PREPARED			SHEET	07
PROJECT ENERGY ENGINEERING	ANALYS	IS		-	BASIS FO			n completed)
LEAD ARCHITECT ENGINEER				·		] cooe c	reliminary : (Final de	
REYNOLDS, SMITH AND	HILLS	A.E.	P., I	NC.	0 01	THER (Sp	ed (7)	
DRAWING NO.		ESTIM	ATOR	7 L LON		CHECKE	?Hw	tchino
The Control of the Co	QUANT			LABOR		MATERIA	L	TOTAL
FAN CONTROLLER	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER	то.	FAL	COST
DIP TANK COVER	39	EA	320	12,480	500	19,5	00	31,980
MOVEARLE MOUNT.								
FAN PRESSURE							,	
XMITTER	20	EA	160	3,200	550	11,	000	14,200
CONTROLLER	20	EA	160	3200	550	-11,	000	14,200
FAN MOYOR VARI.				1				
FREA. DRIVE	20	EA	320	6,400	2800	56,	000	62,400
·				. 25,280		97	500	122780
				1 23,200			200	122,400
For ORIP Covers ,	· lana	-		131980		26°	70 oj	project costs
(8) (1)(1)	-			127,780			78 9	
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ENG FORM 150

\* W.S. GOVERNMENT PRINTING OFFICE . 1968 0-\$1610





Exhaust Hood

Quantity of air exhausted,

Q2 = 100 to 150 cfm /sq.ft.of
tank area, depending on temperature of liquid, cross drafts,
agitation, etc.

Hood height should be, H = D x tan. 10°. = 0.18D

and the transfer of the contract of the second of the seco

Pressure Slot

Quantity of air supplied,

where; D = length of throw, feet E = entrainment factor.

Throw length, D, feet	Entrainment factor, E
0-8	2.0
8 - 16	1.4
16 - 24	1.0
over 24	0.7

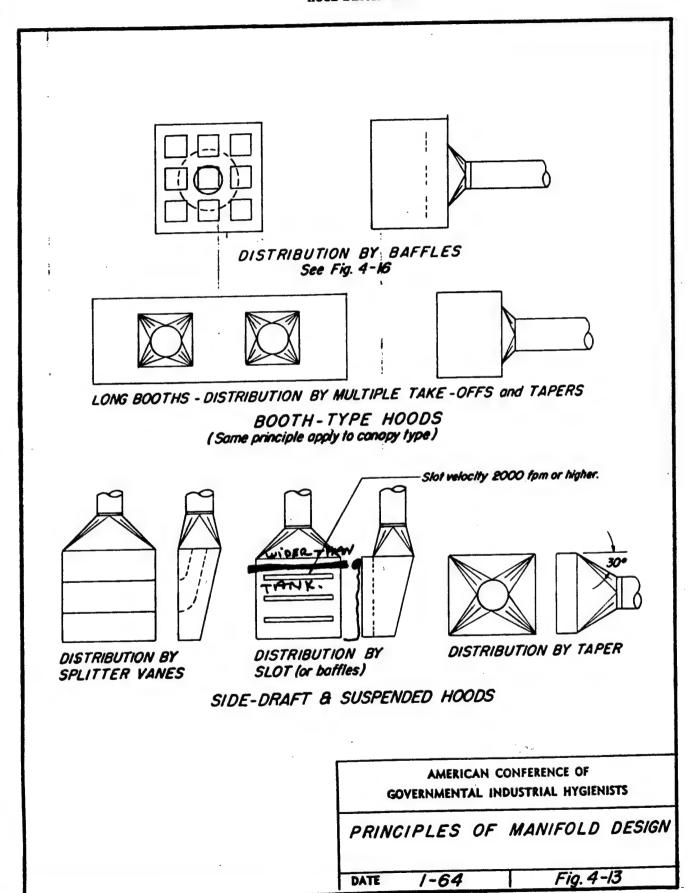
Slot width W should be designed for a velocity of 1000 to 2000 fpm.

Design such systems so they can be easily modified or adjusted to obtain desired results.

AMERICAN CONFERENCE OF
GOVERNMENTAL INDUSTRIAL HYGIENISTS

HOOD DESIGN DATA

DATE 1-64 Fig.4-17



DUNS: 04-598-0844 TELEPHONE: 812/879-4224 OUT OF STATE: 800/457-4408

FAX: 812/879-4227

11 LOUSISA STREET, P.O. BOX #26, GOSPORT, INDIANA 47433

March 15, 1991

REYNOLDS, SMITH & HILLS 4651 SALISBURY ROAD 32256 JACKSONVILLE, FL ATTN: GEORGE FALLEN

Dear George:

Please find the information that I have enclosed for you per our recent phone conversation.

You can be assured that Gosport Manufacturing Company will provide you with the best in quality and excellent service in meeting your tarpaulin needs. Not only do we offer quality, 100% American made products, we stand behind everything we make.

If I can be of any service, or if you have any questions, please do not hesitate to call me at 800-457-4406. Thank you for your consideration!

Looking forward to doing business with you!

Sincerely,

David S. Daubenheyer Account Executive

DSD/mg

Enclosures

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CANVAS TARPS*         1 Cross         6 c.         1 V. horn         Dail, Brown         354           Sealer         4         TCSH1         15 c.         1 V. horn         Dail, Brown         354           Sealer         4         TCSH1         15 c.         1 V. horn         Dail, Brown         275           Sealer         4         TCSH1         15 c.         1 V. horn         Dail, Brown         275           Mystel         3         TCSH1         15 c.         Relationed patches, brees grounded         Dail, Brown         284           Mystel         3         TCSH1         15 c.         Relationed patches, brees grounded         Dail, Brown         284           Mystel         3         TCSH1         15 c.         Repeticion, brees grounded         Dail, Brown         284           Mystel         4         TCSH1         15 c.         Repeticion, brees grounded         Dail, Brown         284           Mystel         4         TCSH1         15 c.         Repeticion, brees grounded         Dail, Brown         284           Mystel         4         TCSH1         15 c.         Repeticion, brees grounded         Dail, Brown         284           Mystel         7         15 c.	3077	CATALOG	OADER	WEIGHT	DESCRIPTION	COLOR	(New Mar Par)
1   10   10   10   10   10   10   10	NAVAS TA	1P\$-					
1   1   1   1   1   1   1   1   1   1	*		TCHOS	. 005.	1%" hem	Drab, Brown	344
1   1   1   1   1   1   1   1   1   1	1	•	TCM18	10 ez.	1%" hem	Drab, Brown	256
1 TONIS   14 8 ct.   14' No.   14' No.   14' No.   14' No.   15 ct.   14' No.   15 ct.   15	1	•	TCN12	12 oz.	1%" hem	Drab, Brown	276
9         TCRN9         6 e.t.         Reinfoldung perioments         Drob. Brown           3         TCRN18         11 6 st.         Reinfoldung perioments         Drob. Brown           4         TCRN18         11 6 st.         Reinfoldung perioments         Drob. Brown           4         TCRN18         11 6 st.         Reinfoldung perioments         Drob. Brown           4         TCRN18         11 8 st.         Repet-firem, twe sens of selecting         Drob. Brown           4         TCRN18         11 8 st.         Repet-firem, twe sens of selecting         Drob. Brown           3         TCRN18         11 8 st.         Repet-firem, twe sens of selecting         Drob. Brown           3         TCRN18         11 8 st.         Repet-firem, twe sens of selecting         Drob. Brown           3         TCRN18         12 st.         Drives, reinforced patches, trees in twen         Drob. Brown           3         TCRN18         13 st.         Brown         Drives, reinforced patches, twee in twen         Drob. Brown           3         TCRN18         13 st.         Trees and puncture resistent         Drob. Brown         Drob. Brown           4         TVAL18         13 st.         Tes and puncture resistent         Brown         Drob. Brown	*	-	TCNIS	14.0 04.	1½" hem	Drab, Brown	**
9         TCR15         18 oz.         Reinforced pelobas, brase grommets         Drab, Brown           8         TCR15         18 oz.         Rejectivities         CPA Residenced gelobas, brase grommets         Drab, Brown           4         TCR16         18 oz.         Rejectivities         Rejectivities         Drab, Brown           4         TCR16         18 oz.         Rejectivities         Drab, Brown         Drab, Brown           5         TCR16         18 oz.         Rejectivities         Drab, Brown         Drab, Brown           9         TCR16         18 oz.         Rejectivities         Drab, Brown         Drab, Brown           9         TCR16         18 oz.         Drings, reinforced gelobide, rejectivities         Drab, Brown           9         TCR16         18 oz.         Drings, reinforced gelobide, rejectivities         Drab, Brown           1         TCR16         18 oz.         Drings, reinforced gelobide, rejectivities         Drab, Brown           1         TCR16         18 oz.         Drings, reinforced gelobide, rejectivities         Drab, Brown           1         TCR16         18 oz.         Drings, reinforced gelobide, rejectivities         Drab, Brown           1         TVL14         18 oz.         Drings, reinforced gel		-	TCROS	101	Reinforced patiches, bress grommels	Orab, Brown	266
9         TCR12         12 oz.         Referenced pubbles, brase groenments         Ones, Brown           4         TCR16         1.6 oz.         Repair-tr-vent, two rever of abliching         Dahs, Brown           4         TCB10         1.6 oz.         Repair-tr-vent, two rever of abliching         Dahs, Brown           4         TCB10         1.8 oz.         Repair-tr-hent, two rever of abliching         Dahs, Brown           5         TCB10         1.8 oz.         Prings, reinforced patches, reperior-hen         Dahs, Brown           5         TCB10         1.8 oz.         D-rings, reinforced patches, reperior-hen         Dahs, Brown           5         TCB10         1.8 oz.         D-rings, reinforced patches, reperior-hen         Dahs, Brown           5         TCB10         1.8 oz.         D-rings, reinforced patches, reperior-hen         Dahs, Brown           6         TVC12         1.8 oz.         Prings, reinforced patches, reperior-hen         Dahs, Brown           6         TVC18         1.8 oz.         Prings, reinforced patches, reperior-hen         Darb, Brown           6         TVC12         1.8 oz.         Trace and punctiver resident         Large bank         Darb, Brown           6         TVC12         1.8 oz.         Toz and punctiver resident         D		-	TCR16	10 02.	Reinforced petahes, brass grommets	Orab, Brown	ž
9         TCR16         14.0 ear.         Referenced patches, brise greenest of atteching         Cribbids         0 ear.         Reper-in-hear, two even of atteching         Cribbids         Desp. Brown           4         TCB16         10 ear.         Reper-in-hear, two even of atteching         Darb, Brown           4         TCB16         12 ear.         Reper-in-hear, two even of atteching         Darb, Brown           3         TCB16         13 ear.         Darby, ceinformed patches, reperin-hear         Darb, Brown           3         TCB16         13 ear.         Darby, ceinformed patches, reperin-hear         Darb, Brown           3         TCB16         13 ear.         Darby, ceinformed patches, reperin-hear         Darb, Brown           3         TCB16         14 ear.         Darby, ceinformed patches, reperin-hear         Darb, Brown           4         TVC18         15 ear.         Darby, ceinformed patches, reperin-hear         Darb, Brown           5         TVC18         15 ear.         Fleene resistant two-end         Carb, Brown           6         TVC18         15 ear.         Toes and purchan resistant         Large techy           6         TVC19         15 ear.         Toes and purchan resistant         Large techy           16         TVE18		-	TCRIE	12 oz.	Reinforced patches, bress growmets	Orak, Brewn	282
4 TCM16 10 at. Repe-in-hom, then seems of abliching Crisk, Brown of TCM16 110 at. Repe-in-hom, how seem of abliching Drak, Brown of TCM16 110 at. Repe-in-hom, how seem of abliching Drak, Brown of TCM16 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. Drings, reinforced patches, repe-in-hom Drak, Brown of TCM10 110 at. These and puncture resistant Large surfery of TVC22 22 at. Tear and puncture resistant Large surfery of TVC22 22 at. Tear and puncture resistant Large surfery of TVC22 22 at. Tear and puncture resistant Drak, Brown of TYPED 0 10 at. Tear and puncture resistant Drak, Brown of TYPED 0 10 at. Tear and puncture resistant Drak, at the tear of Drings, reinforced patches, repe-in-hom Blue Charge surfery of TYPED 0 10 at. Tear and puncture resistant Drak, at the tear of Drings, reinforced patches, repe-in-hom Blue Charge surfery of TYPED 0 10 at. Tear and puncture resistant Drak, at the tear of Drings, reinforced patches, repe-in-hom Blue Charge surfery of TYPED 10 at. Drings, reinforced patches, repe-in-hom Blue Charge surfery of TYPED 10 at. Backe from piece geods, fabric varies Varies 8 at 9, 10 at 10 at. No rub of or disnesses Peerl 8 at 10 at 10 at. Army Duck, no nub off denage Peerls 8 peerls 8 at 10 at 10 at. Army Duck, no nub off denage Peerls 8 peerls 8 at 10 at 10 at. Army Duck, no nub off denage Peerls 8 peerls 8 at 10 at		-	TCRIE	14.8 04.	Reinforced patches, briss grommals	Orsb, Brown	336
4         TCM10         19 ear.         Rega-th-Them, thee tees of elibohing         Drub, Brown           3         TCD415         1.48 ear.         Rega-th-Them, thee tees of elibohing         Drub, Brown           3         TCD416         1.48 ear.         D-fright, reinforced publishes, rega-th-Hem         Drub, Brown           3         TCD416         1.68 ear.         D-fright, reinforced publishes, rega-th-Hem         Drub, Brown           3         TCD12         1.2 ear.         D-fright, reinforced publishes, rega-th-Hem         Drub, Brown           3         TCD12         1.2 ear.         D-fright, reinforced publishes, rega-th-Hem         Drub, Brown           5         TVX16         1.4 8 ear.         Estite durable maderial         Drub, Brown           6         TVX16         1.6 az.         Prings, reinforced publishes, rega-th-Hem         Drub, Brown           6         TVX16         1.6 az.         Prings, reinforced publishes, rega-th-Hem         Drub, Brown           6         TVX16         1.6 az.         Prings, reinforced publishes, rega-th-Hem         Drub, Brown           6         TVX16         1.6 az.         Prings, reinforced publishes, rega-th-Hem         Drub, Brown           6         TVX16         1.6 az.         Toes and purchus residant         Uncyt	1	•	TCMOS	3	Rose-in-hem, twe rows of attiching	Oreb, Brown	266
12 64.   TCM16   14.8 et.   Reperimination   Reperimina	1	•	TCM10	10 01	Reportant, two rows of attiching	Drab, Brewn	*
10   100	•		TCM18	12 62.	Rope-in-hem, two rows of attenting	Drab, Brewn	ž
8         TC086         6 at.         D-frings, reinforced patchbas, rege-tin-hore         Drings, leinforced patchbas, rege-tin-hore         Drings, reinforced patchbas, reinforced patchbas, rege-tin-hore         Drings, reinfor	1		TCM16	14.9 e.c.	Rope-in-hem, twe rews of ethiching	Drab, Brown	336
1   10019   10 0.2.   D-fregs, reinferred patchine, rego- in-horn   Drab, Brown			10000	0 00.	D-rings, reinforces patches, repo-in-hom	Drab, Brown	360
3         TCG112         12 ear.         D-rings, reinferred paidhtes, reger in-hean         Drink, Brown           6         TVM16         18 ear.         Extra durable material         Stack         Combine control           7         TVM16         18 ear.         Extra durable material         Stack         Combine control           8         TVM16         18 ear.         Flame resistant breaded         Combine control         Combine control           9         TVM16         18 ear.         Flame resistant breaded         Combine control         Combine control           8         TVM16         18 ear.         Flame resistant breaded         Combine control         Combine control           9         TVM16         18 ear.         Flame resistant breaded         Combine control         Combine control           10         TVM10         18 a. R. R. Rene resistant control control         Black flowing         Black flowing           10         TVM10         18 a. R. R. Rene resistant control control         White-resistant leaded         White-resistant leaded         White-resistant leaded           10         TVM18         18 a. R. R. Rene resistant leaded         White-resistant leaded         White-resistant leaded         White-resistant leaded         White-resistant leaded         White-resistant leaded		•	TC016	10 0.5	D-rings, retrieveed petelves, rese-tr-hess	Drab, Brewn	276
9         TC016         14.8 ear.         D-rings, reinforced patishes, rege-ich hein         Drah, Brown           6         TVC16         16 az.         Flane resistent         Comment of the Large variety           6         TVC16         14 az.         Tean and puncture resistent         Large variety           6         TVC19         14 az.         Tean and puncture resistent         Large variety           8         TVC19         14 az.         Tean and puncture resistent         Large variety           8         TVC19         15 az.         Tean and puncture resistent         Large variety           9         TVC19         15 az.         Tean and puncture resistent         Large variety           10         TVC19         15 az.         Tean and puncture resistent         Large variety           10         TVC10         15 az.         15 az.         15 az.         15 az.           10         TVC10         15 az.         15 az.         15 az.         15 az.         15 az.           10         TVC10         15 az.         15 az.         15 az.         15 az.         15 az.         15 az.           10         TVC10         15 az.         16 az.         16 az.         16 az.         16 az.         16 az	-	•	TCG12	12 or.	D-rings, reinfereed patehes, repo-in-hess	Drab, Brown	**
5         TVM16         16 at.         Extra durable material         Stact           6         TVL16         16 at.         Plane resistant loseed         Orn. Red. But           6         TVC22         22 ot.         Test and prinches resident         Large surfay           8         TVC22         22 ot.         Test and prinches resident         Large surfay           9         TVC22         22 ot.         Test and prinches resident         Large surfay           10         TVC22         22 ot.         Test and prinches resident         Large surfay           1         TVC22         22 ot.         Test and prinches resident         Large surfay           1         TVC22         22 ot.         Test and prinches resident         Large surfay           1         TVC22         22 ot.         Test and prinches resident         Large surfay           1         TVC22         10 at.         10 at.         Operations         Blac           1         TVC22         10 at.         10 at.         Operations         Blac           1         TVC22         10 at.         10 at.         Operations         Operations         Operations           1         TVC22         10 at.         Made from piece goods, labri		•	TCO18	14.8 oc.	D-rings, reinforced petches, rope-in-hem	Drab, Brown	ž
TVL 16   10 82.   Flame resident Waters   TVL 16   10 82.   Flame resident treated   Grin. Ned. Blue		-	Tronse	18.00			
TVL16   10 at.   Plano residiate Water   TVC18   10 at.   Plano residiate to tested   Conf. (Ed. (Ed. )   TVC18   10 at.   Test and periodure resident   Large variety     TVC18   TVC18   Test and periodure resident   Large variety     TVC19   TVC19   Test and periodure resident   Large variety     TVC19   TVC19   Test and periodure resident   Large variety     TVC19   TVC19   TC10   TC10   TC10   TC10   TC10     TVC10   TVC10   TC10   TC10   TC10   TC10     TVC10   TC10   TC10   TC10   TC10   TC10     TVC10   TC10   TC10   TC10   TC10   TC10   TC10     TVC10   TC10   T			Ol Wal	1	CALL CALLERY MANAGEMENT	BABCE	2/4
TVL 14   14 ca.   Flame resistant breeked   Grn, Red, Biu     TVC25   22 ca.   Tear and puncture resistant   Large variety     TVC22   22 ca.   Tear and puncture resistant   Large variety     TVC22   22 ca.   Tear and puncture resistant   Large variety     TVC22   22 ca.   Tear and puncture resistant   Large variety     TVC22   TVC23   Tear and puncture resistant   Blue     TVC24   TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   TVC25   TVC25   TVC25   TVC25   TVC25     TVC25   T		-	TVL16	10 az.	Flame resistant tremes	URN, MWS, BRU	275
TVC16   18 02. Toes and punctive resident   Large variety     RPS	frederic	•	TVL14	14 oz.	Flame resistant treated	Grm, Red, Blu	\$ 4
TVC22   22 cz. Tose and puncture resident Large variety     RP\$	-	•	TVC18	18 02.	Tear and puncture recisions	Large variety	476
TPU   D-friegs, reinfecced gestiones, rape-in-how Blue	1	•	TVC22	22 oz.	Tear and puncture resistent	Large variety	23
TPU	LYETHYL	ENE TARPS					
TPA   Report Now, the rest of disholog   Blue	Sweeper	-	24		D-rings, reinferced petches, repe-in-hem	Blue	186
TP-9697	American	•	AQL		Repo-in-hem, two rows of attaching (Orders less than \$100, 8.5c per eq. ft.)	3	3
TP1604   10 ± D4   White/Phile   TP1212   12 ± 12   Each/Phile   TP9214   12 ± 12   Each/Phile   TP9214   Each/Phile   TP9214   10 ± 10 × 10 × 10 × 10 × 10 × 10 × 10 ×	100	•	TPOSER		8 x 9, flame realstant	Opedne	146
TP1212   12 x 12   BiscLVmis   BiscLVmis   TP3010   0 x 0, UV resistant   White/White   TP3010   10 x 10	7.0	2	TP16D4		10 x D4	White/White	*
TPSIGIG   10 x 0, UV resistant White.Vivile	7 25	95	1791212		12×12	Black/White	#
TARIFE	Tap	2	TPBBUY		8 x 9, UV resistant	White/White	25
TARPS TRES 10 cs. Made from piece geods, labric varies Varies TRES 12 cs. Made from piece geods, labric varies Varies 2 TRES 10 cs. No rub ort or discoloration dennage Peerl 8 TDF 10 10 cs. No rub ort or discoloration dennage Peerl 8	Yers		TPS1018		10×10	Silver	*
TRYS 10 02. Made from piece goods, fabric varies Varies TRYS 12 84. Made from piece goods, fabric varies Varies 8 TRYS 10 02. No rub ort or discoloration demage Paeri 8 TDY 100 10.02. Anny Duck, no rub off demage Peeri 8	P-Bler Terpe	n Poly-Sier Sec					
TIP18 10 ct. Made from place goods, labric varies Varies 8 TIP12 12 ct. Made from place goods, labric varies Varies 8 TIP19 10 ct. Ho rub off or discoloration demage Pearl 8 TIP19 10 ct. Array Duck, no rub off demage Pearl 8	PLATION	PIGHTER TA	IRPS				
TDF12 12 at. Made from place goods, labric warks Varies 2 TDF18 10 at. He rub off or discoleration demage Pearl B TDF16 10.3 at. Array Duck, no rub off damage Pearl B		•	TIFIG	10 02.	Made from piece geods, fabric varies	Varies	*
TDF18 10 02. No rub off or discoleration demage Pearl B TDF108 10.3 02. Array Duck, no rub off damage Pearl B		•	TIF12	12 ez.	Made from piece goods, fabric varies	Varies	22.54
TDF18 10.2c. No rub orl ex discoloration dennage Pearl B TDF103 10.3 oz. Anny Duck, no rub orl dennage Pearl B	Y FINISH	TARPS					
TDF163 10.3 oz. Army Duck, no rub off domage Pearl B.		•	10616	10 04.	No rub off or discoloration demage	Post 8	36
		•	TDF169	10.3 oz.	Army Duck, no rub off demans	Paris de	27.6

# COVERS

	CATALOG	NUMBER	WEIGHT	DESCRIPTION	COLON	PRICE (per se, ft.)
WIMMING	FIMMING POOL COVERS	ERS				
ŀ	•	CVPR18	16 ex.	Vinyi laminoled, reinferced patches & webbing	Orn, Red, Blu	376
pile	•	CVPR14	14 62.	Wayt taminated, reinferent patches & webbing	Orn, Red, Sh	3
and the same	•	CPPAL		Light weight poly, reinferced petches & webbing	Blee	136
merinen	•	CPPAH		Heavy weight poly, reinforced patches & webbing	Blue	236
*	•	CNP		Reinforced patiches & webbling	Multi-color	366

\*Commercial Convas Flame Resistant, add 54 per square foot.



NAME	CATALOG	ONDER	WEIGHT	DESCRIPTION	COLOR	TO THE PARTY OF
CAR COVERS	99					
1	11	CDC-A		Poly-cotton blend, elastic & be downs	Pearl Green	154.00 not
	11	8-000		Poly-oothen blend, electic & the downs	Post Green	101.90 nel
	11	cocc		Pety-cetton blend, clastic & tie downs	Pearl Green	167.00 med
	11	G-DG-D		Poly-setten bland, eleatic & the downs	Pearl Green	172.68 met
	11	1-000		Poly-setten bland, electic & the downs	Pearl Green	177.80 med
	11	₽-OGO		Pely-setten blend, electic & tie dewns	Pearl Green	164.98 med
	11	MCSB		Car serer sterage hag		12.06 and
FRUCK COVERS	ERS					
Ŧ	-	CNTT		Top grade PVC seated poly net, 2" home	Orn, Blu, Bit.	*
3	•	CHTE		Comomy grade, 1%" hom	Varies	ž
teel Hauter		CCH12	12 oz.	Cetten Duck, D-rings set into sevo hands	Drait, Brown	ž
test Heuder	•	CCM18	14.8 esc.	Cetton Duck, D-rings set into sere bends	Drab, Brown	\$
heel Hauter	-	CANIB	18 04.	Vinyl essind syles, D-rings set into sere bands	Large vertety	2
GYM COVERS	92					
Cenves	13	ccate	10 62	Flore resistant, meets state achool fire cades	Te	Overte
Penyl	13	CVG18	10 er	Cemplebely underproof & Rame resistant Meets state school fire codes	Large variety	9
FIELD COVERS	FR8					
Olyothylene	t1	3		Completely waterproof, high UV treated	1	Overte
inyl	13	CVF16	10 or.	Durable pover, completely waterpraet	Large veriety	See.
Teryt	13	CVF14	14 ez.	Durable cover, completely waterpreaf	Large vertety	Over
BALVAGE COVERS	OVERS					
Serves	10	CC813	12 or.	Triple-thick hem		*
Sarves Duck	10	CCSD	412	Triple-Block here		3
Jey Flesiah	10	CD818	16.36 oz.	Triple-thick hem, no rub off demage	Prest	*
Dry Fledeh	10	CD813	13 oz.	Triple-thick hem, no rub off demage	Prest 8	*
Viny	10	CVS18	10 O.L.	Why! laminated nyton, triple-thick hem	Red, Green	*
Vieryd	10	CVB14	14 02.	Whyt laminated nyton, triple-thick hem	Red, Green	3
BOAT COVERS	RS					

	CATALOG	ONDER			BOAT	MEAN	STOCK	STOCK	¥
387	FAUE	NO.	WEIGHT	DESIGNED FOR	(Fee.)	(Inches)	HUMBER		
Standard	12	CDBS14	Je (	V-Hull	2	3	RF-14		2.2
Standent	12	CDBS16	100	V-Hull	15	Z	MF-15		2
Standard	12	CD8816		V-Holl	=	2	AF-16		3
Standard	13	CD8817	. B ez.	A-Hull		2	NF-17		
Standard	12	CD8818	l er.	N-H-M	=	=	AF-18		2.5
Dekare	12	CD8014	10.5 ez.	V-Hull	*	3	DRF-14		3
Detuse	13	CDBD16	10.5 ez.	K-Hull	=	2	DAF-16		20
Delaxe	12	CD8D16	10.5 ez.	V-Hull	=	=	DARF-16		3
Delune	12	CDED17	10.5 or.	V-Hull	11	=	DAFF-17		3
Dekure	12	CD8D18	10.5 oz.	V-Hull	=	=	DAF-16		3
Tri-14ml	13	CDST16	10.5 ec.	Cothodral Hulbs	=	2	RL/O-15	BO-16	3
Tri-14uil	12	CDST16	10.5 ac.	Cothodral Hoffs	=	2	Rt/O-16	RO-16	3
Tri-Huff	12	CDST17	18.5 ez.	Cothodral Huffs	11	2	RI/O-17	11-04	Ŧ
Tri-Hull	13	COST18	18.6 oz.	Cathedral Hulls	=	2	NVO-16	NO-16	L

<b>Project</b>	No	
1 10,000	110.	 

# Project No.

<u> </u>	EXPLAINED FLEXIBLE DIP TANK COVERS WITH FAN
B.F.	ADVISED THAT OSHA HAS VERY SPECIFIC REQULATIONS  RE: MINIMUM DIP TANK AIR FLOW REQUIREMENTS AIMS  AT PROTECTING WORKERS From ON THE JOB HAZARDS.
	ALTHOUGH REDUCING THE BIR FLOW WOULD BE A "TECHNICAL" VIOLATION, NO CITATION WOULD BE ISSUED AS LONG AS THERE WAS NO HABARD TO THE WORKER.
	HE FELT THAT AS LONG AS THE FANS WERE  drawing Air From THE CAVITY BETWEEN THE  COVER AND THE FLUID THAT ANY EXOLVED FUMES  WOULD STILL BE EXHAUSTED.
NOTE:	MR FINK ADVISED THAT DIP TANK VENT FANS SHOULD BE OPERATED AT ALL TIMES (24 HRS Id AS A GENERAL RULE. THIS WAS ECHOED BY
	LEAD HYGIENISTS.

1 August 1982

SAMESTATION FOR BEOCH CTIVITY CABITAL INVESTMENT PROGRAMS		1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL	DNTROL SYMBOL
For use of this form, see AR 6-4; the proponent agency is OCA.	÷.	AMC OSD PIF		DD-M(R) 1561	1) 1661
P. TO: HO DA IS AMC		Commander		6. DOD COMP NAME Army	6. DOD COMP CODE A
tn: DACS- itagon		Attn: AMSDS-RM-P Chambersburg, PA 17201-4170	M-P PA 17201-4170	7. COMMAND CODE ) W730KK	8. DATE 10/9/91
			11. AMORTIZATION YEARS/MONTHS	LAS/MONTHS	
Drive-In Paint Booth Air Flow Control	okir	3 OSD PIF   PECIP	237,128	÷ 64.100	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cost)	(Average Annual Sarbigs)	
024	15		3.7 or	(month)	(amortization)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE 1	17. PROJECT DESCRIPTION	NOI		,	•
Commander Letterkenny Army Depot Attn: SDSLE-EM (T. Hagie) Bldg. 663 Chambersburg, PA 17201-415D	Speed contro correct vent flow during	Speed controllers are used on exhaust and supply fans to maintain correct ventilation rates under varying conditions and minimize flow during unoccupied times.	on exhaust an nder varying s.	d supply fans conditions an	to maintain d minimize
Supply and exhaust fans operate continuously during work to building negative pressure. This project would allow are unoccupied, but not allow back flow of outside air.	continuously during work This project would allow Ick flow of outside air.		shifts for convenience and to keep back flow due fans to throttle back and save energy when booths	nd to keep ba d save energy	ck flow due when booths
18. SAVINGS DISPOSITION					
Savings are used to reduce energy expend	expenditures				
20. OTHER REMARKS (Continue on page 5, if more space is needed)					

1 August 1982

4	ر			SUMMA (ROUND OF	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	VINGS DOLLAR!				
			Attach	tiech computation theet identifying the method and source of data for savings	nufying the method a	nd source of data for sa	אוענו	DIFFERENCE/SAVINGS	SAVINGS	
-	SAVINGS	PRESENT	1ST VR	2D VR 3D	30 VR	4TH VR	15T YA	20 VR	30 VA	4TH YR
VEN	SALANY/LABOR/ OVERTIME									
MATERIA	MATERIAL									
1 5	UTILITIES									
MAN	MAINTENANCE/ REPAIR	-								
TA A	TRANSPORTATION									
3	LEASE COSTS									
SALVAGI TURN-IN	SALVAGE/ TURN-IN									
EN EN	Elec. & fue	\$261,800	\$197,700	\$197,700	\$197,700	\$197,700	\$64,100	\$64,100	\$64,100	\$64,100
ं हुं	CONTRACT COSTS									
P P	OTHER (Identify)									
<u> </u>	TOTALS	\$261,800	\$197,700	\$197,400	\$197,700	\$197,700	\$64,100	\$64,100	\$64,100	\$64,100
1					PRIORITIZATION					
8	INTERNAL RAT Divide estimate Based on facto	INTERNAL NATE OF RETURN (IRR)  Divide estimated project cost  Desed on factor and number of years economic life	, 128 by	average annual savings $64,100$ = $3.7$ factor. for of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4 =	64,100	3.7 (1.8) App H, Ch. 5,	. factor. . 6, AR 6-4 =	30 × IRR.	# #	
(2)		Multiply annual sevings 64, 100	10 X discount factor	7.98	511,500	00 and divide by present value of investment	went value of in	vestment		
	(Based on sconomic life	Ē	years, select disc	years, select discount factor from Table H-4, App H, Ch. 5, AR 5-4.	ıble H-4, App H, Ch	. 6, AR 6-4.				
3		NATE OF INVESTMENT PER MANFOWER SPACE (RI. Divide estimated project cost	WEN SPACE (RIMS)	N/A N/A by number of manpower space savings.	r space savings			RIMS,		
	(Manpower re-	(Manpower requivalents cannot be used in this computation.)	used in this comput	erion.)				98.		i.

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				7
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS
•	q	v	9		,	
w Variable-Speed Controls	-	\$5,928	40	\$237,128		
and Devices						
(0)						
(4)						
(9)						
(6) TRANSPORTATION (Equipment delbery)						
(1) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION	300					
(P) MAINTENANCE CONTRACT <sup>2</sup>						
(10) FACILITIES MODIFICATION <sup>3</sup>					·	
(11) TRAINING						
(12) OTHER (Specify):					·	
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATION	ME OPERATIONAL			\$237,128		
(14) TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			\$237,128		
(15) TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER BOURCE <sup>6</sup>			1	A	
(16) TOTAL (8um of (14) + (15) abous)	16) above)			\$237,128		

Inot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

<sup>3</sup>Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

1 August 1982

ध				SUMMARY OF SAVINGS (MANFOWER AND DOLLARS)	NGS (MANFOWER,	AND DOLLARS)				
			SAVINGS				REAPPLICATION OF SAVINGS	FSAVINGS		
	ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	LEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	ON CODE
	•	•	J	7	FROM	10	FROM	01	FROM	100
3	NEQUINEMENTS AND AUTHORIZATIONS ELIMINATED								1	
3	REQUIREMENTS ONLY ELIMINATED	-								
6	BORROWED MILITARY MANPOWER RELEASED									
રે	OVERHIRES OR TEMPOSIARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
€	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
ê	OTHER DOLLAR SAVINGS [Excluding Manpower], e.g., CONTRACT COSTS & UTILITIES									
3	Electricity			\$16,400						
ŝ	#2 Fuel Oil			\$28,300						
625	#6 Fuel Oil			\$19,400						
8	TOTAL BOLLAR SAVINGS			\$64,100						
<i>•</i>	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Restrict appects challes bei	duther being per	ng performed with additional manhours available (equivalent manyears)	nel manhours evaile b	k (equivaknı many	er j			

Figure H-1. Documentation for Productivity Capital Investment Program (DA Form 5108-R)—Continued.

C 1, AR 5-4

1 August 1982

24. REGULATORY APPR	REGULATORY APPROVAL/COORDINATION	
INVESTMEN	INVESTMENT STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning.  The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	or facilities. This investment is in accordance with established investory constraints.	ment planning.
	•	
(Cite regulatory approvals, e.g., TAGO Conti	fulctory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.)	
b. OTHER COORDINATION (Punelional Coordination at local lauel, e.g., Fac Eng. Log. Pera etc.)		
28. BURMITTED BY MYSEL SEELS S		
Initiater)	SIGNATURE	DATE (YYMMDD)
		AUTOVON
AND THE COMMENDED BY (MACON/Agency)	BIGNATURE	DATE (YYMMDD)
		AUTOVON
FOR USE BY HQDA ON (	FOR USE BY HQDA ON OSD PIF PROJECTS ONLY	
		DATE (YYMNDD)
	j<	AUTOVON
20. OTHER REMARKS (Cont'd)		
		Mary .

Part 6 of DA Form 6106-R

ECO Number: 10

#### DRIVE-IN PAINT BOOTH AIR FLOW CONTROL

#### Discussion

The two paint booths in Building 350 and the eight in Building 320 are large enough to enclose large tracked and wheeled vehicles. Supply air fans move outside air across a steam coil and into the paint booth. The exhaust fans draw air and fumes from the booth and discharge them to the atmosphere. Because of the variable pressure drops caused by the filters and the unsteady building negative pressure, the fans are hard to balance. This imbalance sometimes causes low air flows, a violation of OSHA regulations, and positive booth pressure which releases paint fumes into the building, a fire hazard. Additionally, the fans are allowed to operate at all times, even though no painting is being done because, while running, they prevent cold air from being drawn back into the booth by the negative pressure in the building. During the winter this back flow would allow cold air to blow on a freshly painted vehicle potentially ruining the paint job, and making the surroundings uncomfortably cold.

The recommended controls would solve all of these problems. Both supply and exhaust air fans are supplied with variable frequency (variable speed) drives and analog control loops. The supply air fans would supply the required flow, and the exhaust fans would maintain the required negative pressure. The supply air fan would supply the required air flow even if the filters get a little plugged, or if the building pressure were to change. Likewise, the exhaust fan would remove just enough air to keep the booth under a slightly negative pressure relative to the building interior. When painting is stopped, and the booth doors opened, the fans (supply and exhaust) would reduce speed to minimize backdraft air flow. Furthermore, in a manual mode, the controls will allow accelerated warm-up of cold vehicles inside the booth. This would liberate the valuable floor space in Building 350, now used for this purpose, for other, more productive activities.

The recommended fan controls optimize booth air flow and pressure while painting is under way and reduces air flow to a minimum when there are no

painting activities. These controls will save energy through reduced electrical consumption and reduced fuel consumption.

#### Recommendations

Based on the Life Cycle Cost Analysis, this project is recommended.

Construction Cost	\$212,670
Annual Energy Savings (MBtu/yr)	
Electricity	1,503
No. 6 Fuel Oil	4,397
No. 2 Fuel Oil	5,674
Annual Energy Cost Savings (\$/yr)	\$64,100
SIR	3.8
Simple Payback (years)	3.7

PF F I	ENERGY CONSERVATIO STALLATION & LOCATION OJECT NO. & TITLE: EC SCAL YEAR 1992 DIS ALYSIS DATE: 10-14-9	: LETTERKENNY O #10 PAINT CRETE PORTION	ADRI BOO' NAMI	EGION NOS TH AIR FL E: TOTAL	. 3 CENSUS: OW CONTROL PROJECT	1	
1.	INVESTMENT A. CONSTRUCTION COST B. SIOH C. DESIGN COST D. SALVAGE VALUE COST E. TOTAL INVESTMENT	T ST (1A + 1B + 10	C - 1	ID)		\$ \$ -\$	212670. 11697. 12761. 0. 237128.
2.	ENERGY SAVINGS (+) / ANALYSIS DATE ANNUAL	(-)				NGS	
	FUEL \$/MBTU(1)		SAV	/INGS(3)	FACTOR(4)	SA	/INGS(5)
	A. ELECT \$ 10.94 B. DIST \$ 4.98 C. RESID \$ 4.41 D. NAT G \$ .00 E. COAL \$ .00	1503. 5674. 4397. 0. 0.	\$ \$ \$ \$	16443. 28257. 19391. 0. 0.	10.75 14.08 16.21 13.25 11.13		176760. 397852. 314324. 0. 0.
	F. TOTAL						
3.	NON ENERGY SAVINGS(+)	/ COST(-)					
	A. ANNUAL RECURRING ( (1) DISCOUNT FACT	+/-) OR (TABLE A)			10.59	\$	0.
	(2) DISCOUNTED SA	VING/COST (3A	X 3	A1)	10.03	\$	0.
	C. TOTAL NON ENERGY D	ISCOUNTED SAV	INGS	(+)/COST(	-)(3A2+3Bd4	)\$	0.
	B IF 3D1 IS C IF 3D1B IS	QUALIFICATIONERGY CALC (2 = OR > 3C GO < 3C CALC = > 1 GO TO < 1 PROJECT	F5 X TO SIR ITE	.33) ITEM 4 = (2F5+3D M 4	1)/1F)		
4.	FIRST YEAR DOLLAR SAV	INGS 2F3+3A+(	3B1D,	/(YRS ECO	NOMIC LIFE)	\$	64090.
5.	TOTAL NET DISCOUNTED	SAVINGS (2F5+	3C)			\$	888937.
6.	DISCOUNTED SAVINGS RA (IF < 1 PROJECT DOES		<b>(</b> S)	IR)=(5 /	1F)= 3.75	5	
7.	SIMPLE PAYBACK PERIOD	(ESTIMATED)	SI	PB=1F/4	3.70	)	

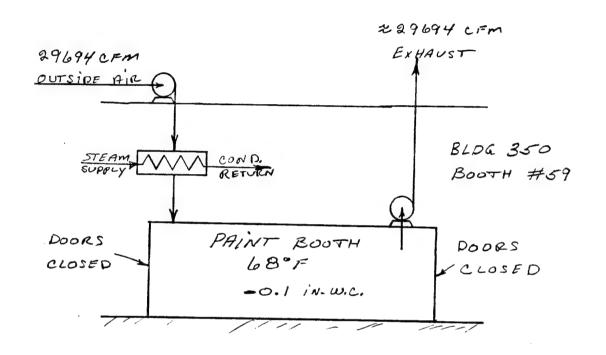
LIFE CYCLE COST ANALYSIS SUMMARY

STUDY: ECO10

# RSH,

SUBJECT	LEAD ECOTIO	AEP NO 290-0379-001
		SHEET OF
DESIGNER	G. Fallon	DATE
OUE OVER	D. Antelia	

# ECO #10 PAINT BOOTH AIR FLOW CONTROL



CALCULATE CURRENT HEAT LOSS

ASSUME: 68°F EXHAUST TEMP

29,694 CFM (LEAD, PAINT BOOTH STUDY, BKA, 1987, Pg 94)
BOTH FANS CAN BE SHUT DOWN FOR 50%

OF THE TIME.

2441d, 5d luk OPERATION

118,470 BTU/CFM/YR (HEAT LOSS CALC., ENCLOSED)

O.B BOILER Efficiency.

CONSUMPTION = 118470 BTY/FM.4R x 29694 CFM = 4,400 MBTW/4R
0.8 × 106 RTW/MBTW

SAVINGS #4 016

ENERGY = 4,400 mBtulyr x0.5 = 2200 mBtulyr

	DC	0.7	
<b>L</b> i	O		
		-	@

SUBJECT LEAD ELD #10	AEP NO
SUBJECT	SHRET 2 OF
DESIGNER OF	DATE
	DATE

ECO 10 (CONT.)

CALCULATE CURRENT ELECTRICAL CONSUMPTION

ASSUME: TOTAL DP = 5.0 IN W.C (2.5" IN \$ 2.5" OUT)

FAN & MOTOR Eff = 0.6 2545 = 0.4

6356

FAN ENERGY = .4 X FLOW X HEAD = .4 x 29694 CFMX 5 = 99081 BTG

ANNUAL ENERGY = 990818/1 24 H/d x5d/wk x52 w/yR - 618 more

SAVINGS

ENERGY ELEC 6/8 MBTU/YR X 0.5 = 309 MBTU/YR ELEC

COST BLEC

309 mBTU/4RX \$10.94/MBTU = \$3382/4R ELEC.

#### TOTAL SAVINGS

FROM PQ 1: #6010 - 2200 MBTW/42 ELEC - 309 MBTW/42

NOTE: THE ABOVE TECHNIQUE WAS APPLIED TO LARGE PAINT SPRAY BOOTHS IN BLOGS 350 \$320 USING SPREAD SHEET SOFTWARE TO GENERATE A PAYBACK ON EACH BOOTH. THE RESULTS ARE SHOWN ON THE SUMMARY SHEET.

SUBJECT LETTER KENNY A - D.	AEP NO
	SHEET 3 OF
DESIGNER 5 F	DATE
CHECKER	DATE

RSH.

- CLOSED BOTH CONTROL LOOPS
  ARE OPERATING & CONTROLING
- 2) WHEN ETTHER LARGE DOOR IS OPEN BOTH FAN SPEEDS ARE REDUCED TO A MINIMUM, ALTO MATICALLY
- 3) THIS CONTROL SCHEME ASSURES
  DESIGN FLOW THROUGH THE BOOTH
  AT A SLIGHTLY NEGITIVE ORESSURE.

AT A SLIGHTLY NEGITIVE ORESSOR,

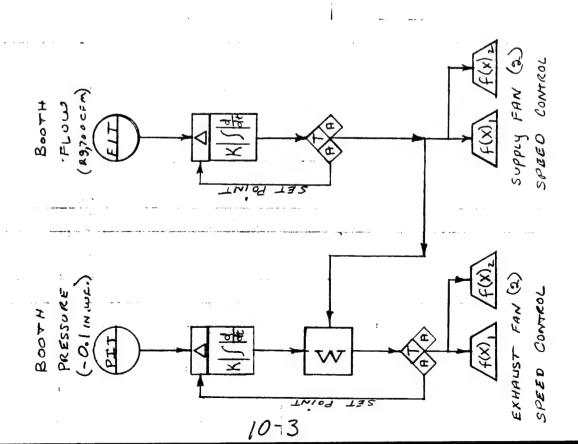
FLOW & PRESSORE WILL BE

MAINTAINED REGARDLESS OF

BUILDING NEGATIVE JRESSORE,

SEASON OF YEAR, OR REGSONABLE

DEGREE OF SYSTEM CLEANLINESS,



LETTERKENNY ARMY DEPOT LARGE PAINT BOOTH FAN CONTROL SUMMARY

RECOMMENDED

BUILDING NUMBER	BOOTH Number	AIR FLOW (CFM)	HOURS PER WEEEK	#6 FUEL SAVED (MBTU)	ELEC SAVED (MBTU)	COST SAVED (\$/YR)	CONST. COST (\$)	PAYBACK (YRS)
350	59	29694	120	2199	309.1	\$13,078	\$23,713	1.8
350	60	29694	120	2199	309.1	\$13,078	\$23,713	1.8
SUBTOTAL		59388	120	4397	618	\$26,156	\$47,426	1.8

#### **OPERATION**

			HOURS	#2 FUEL	ELEC	COST	CONST.	
BUILDING	800TH	AIR FLOW	PER	SAVED	SAVED	SAVED	COST	PAYBACK
NUMBER	NUMBER	(CFM)	WEEEK	(MBTU)	(MBTU)	(\$/YR)	(\$)	(YRS)
320	3880	58876	40	1311	204.3	\$8,762	\$23,713	2.7
320	4378	29172	40	649	101.2	\$4,342	\$23,713	5.5
320	4379	27805	40	619	96.5	\$4,138	\$23,713	5.7
320	4380	27805	40	619	96.5	\$4,138	\$23,713	5.7
320	4381	27805	40	619	96.5	\$4,138	\$23,713	5.7
320	4382	27805	40	619	96.5	\$4,138	\$23,713	5.7
320	4383	27805	40	619	96.5	\$4,138	\$23,713	5.7
320	4384	27805	40	619	96.5	\$4,138	\$23,713	5.7
SUBTOTAL		254878	40	5674	884	\$37,932	\$189,704	5.0

•					
GRAND TOTAL	#6 FUEL	4397	1503	\$64,088 \$237,130	3.7 :
•	#2 FEUL	5674			;

I NOT RECONMENDED :

#### OPERATION

BUILDING NUMBER	BOOTH Number	AIR FLOW (CFM)	HOURS PER WEEEK	#2 FUEL SAVED (MBTU)	ELEC SAVED (MBTU)	COST SAVED (\$/YR)	CONST. COST (\$)	PAYBACK (YRS)
320	3930	2000	40	36	6.9	\$253	\$23,713	93.6
320	3931	2000	40	36	6.9	\$253	\$23,713	93.6

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DY I

SUBJECT *ECC	D# 10 ~	AEP NO		
	5 1 <i>1</i>	SHEET	OF	
DESIGNER	? Hutchins	DATE		
CHECKER		DATE		

7

QRIP Calculations Using Fy92 Fuel Oil Prices

Current energy use:

#### LETTERKENNY ARMY DEPOT ENERGY AUDIT OF INDUSTRIAL FACILITIES

Operation Hrs/Day =

Room or Supply A Air Quantity (cf	ir Conditions - Winter m)	68 1
Hour Fractions	1 AM - 9 AM 9 AM - 5 PM	1
	5 PH - 1 AM	i
Operation Days Pe	er Week	5

		Temp.	Hours	of Occurre	Occurrence T		Delta				Total
		Range	2-9	10-17	18-1	Hours	H or T	Const.	CFM	BTU/HR	BTU
	70	74	247	237	301	785	-4	1.08	1	0	0
	65	69	296	217	278	791	1	1.08	1	1	854
	60	64	269	196	236	701	6	1.08	1	6	4,542
	55	59	249	191	209	649	11	1.08	1	12	7,710
	50	54	221	193	202	616	16	1.08	1	17	10,644
	45	49	218	193	206	617	21	1.08	1	23	13,994
	40	44	237	236	239	712	26	1.08	1	28	19,993
	35	39	289	246	286	821	31	1.08	1	33	27,487
	30	34	304	194	258	756	36	1.08	1	39	29,393
	25	29	184	106	152	442	41	1.08	1	44	19,572
	20	24	124	65	90	279	46	1.08	1	50	13,861
	15	19	75	32	57	164	51	1.08	1	55	9,033
	10	14	54	13	26	93	56	1.08	1	60	5,625
	5	9	18	3	9	30	61	1.08	1	66	1,976
	0	4	9	0	2	11	66	1.08	1	71	784
	-5	-1	3	0	1	4	71	1.08	1	77	307
	-10	-6	1	0	0	1	76	1.08	1	82	82
	-15	-11	0	0	0	0	81	1.08	1	87	0
Total	als		2798	2122	2552	7472					165,858

Total Operation Hours While Heating (and corrected for working days/week) 4776

118,470

Avg outdoor temp while heating (F)

45.0

#### LETTERKENNY ARMY DEPOT ENERGY AUDIT OF INDUSTRIAL FACILITIES

Operation Hrs/Day = 8

Room or Supply Air Air Quantity (cfm)	Conditions - Winter	68 1
Hour Fractions	1 AM - 9 AM 9 AM - 5 PM 5 PM - 1 AM	0.25 0.75 0

Operation Days Per Week

SAMES AND COLORS OF THE PROPERTY OF THE PARTY 5

	Temp. Hours of Occurrence		Total	Delta				Total		
	Range	2-9	10-17	18-1	Hours	H or T	Const.	CFM	BTU/HR	BTU
70	74	247	237	301	240	-4	1.08	1	0	0
65	69	296	217	278	237	1	1.08	1	1	256
60	64	269	196	236	214	6	1.08	1	6	1,388
55	59	249	191	209	206	11	1.08	1	12	2,441
50	51	221	193	202	200	16	1.08	1	17	3,456
45	49	218	193	206	199	21	1.08	1	23	4,519
40	44	237	236	239	236	26	1.08	1	28	6,634
35	39	289	246	286	257	31	1.08	1	33	8,596
30	34	304	194	258	222	36	1.08	1	39	8,612
25	29	184	106	152	126	41	1.08	1	44	5,557
20		124	65	90	80	46	1.08	1	50	3,962
	24	75	32	57	43	51	1.08	1	55	2,355
15	19			26	23	56	1.08	ī	60	1,406
10	14	54	13	9	7	61	1.08	i	66	445
5	9	18	3	2	2	66	1.08	i	71	160
0	4	9	0	- 4	- 4	71	1.08	1	77	58
-5	-1	3	0	1					82	21
-10	-6	1	0	0	0	76	1.08			
-15	-11	0	0	0	0	81	1.08		87	0 :======
Totals		2798	2122	2552	2291					49,865

Total Operation Hours While Heating
(and corrected for working days/week)

1465

35,618

Avg outdoor temp while heating (F)

45.0

## ECO Construction Cost Estimate Calculations

ECO Name: Paint Booth Air Flow Control

ECO #: 10

1991 ECO "bare" costs (from cost <b>estima</b> te sneet) Material Labor	\$113,210 \$25,630
Subtotal bare costs	\$138,840
FICA Insurance (20% of Labor)	\$5,126
Sales Tax (6.5% of Material)	\$7,359
Subtotal	\$151,325
Overhead (15%)	\$22,699
Subtotal	\$174,024
Profit (10%)	\$17,402
Subtotal	\$191,426
Bond (1%)	\$1,914
Subtotal	\$193,340
Contingency (10%)	\$19,334
Subtotal (Construction Cost Input For LCCID *)	\$212,674
SIOH (5.5% of Construction Cost)	\$11,697
Subtotal	\$224,371
Design (6% of Construction Cost)	\$12,760
Total Project Cost	\$237,131

<sup>\*</sup> The SIOH costs (5.5%) and Design costs (6.0%) are automatically added in the Life Cycle Cost In Design (LCCID) analysis program.

CONSTRUCTION COST	)		SHEET	OF:					
ENERGY ENGINEERING	BASIS FOR ESTIMATE								
LOCATION	CODE A (No decign completed)  CODE B (Proliminary decign)  CODE C (Final decign)  OTHER (Specify)								
ARCHITECT ENGINEER									
REYNOLDS, SMITH AND DRAWING NO.	-								
COST FOR ONE BOOT	Н			G, F			P. Hythuis		
SARAY BOOTH SUMMARY	QUANT HO.	HO. UNIT		LABOR	PER	MATERIAL		TOTAL	
	UNITS	MEAS.	UNIT	TOTAL	UNIT	701	PAL .	COST	
VARI-FREG DRIVES (1)	7_	ea	185	740	1781	71.	24	7864	
COPPER TUBINA	300	FT	2,42	726	.78	ત્ર	34	960	
FLOW/INDICATING XMAR		ez	25	25	1000	10	00	1025	
TRESSURF/INDICATING XMTL		ea	25	25	1000	10	00	1025	
PROGRAMABLE LOGIC.	l	Lot		200		8	00	1000	
LIMIT SWITCHES	_ 2_	EA	3.2	164	4200			148	
WIRE 2-14.	S	CLF	26.78	53,57	6.22		44	66	
CONDUIT 12 9	200	LP	2.97	594	.96	19		786	
CONTROL CABINET		<u>L8</u>	135	135	875	8	75	1010	
				0 - 1					
				2563		113	21	13884	
(I) Co.: 1170									
(1) GRANGER (2) MEANS								·	
(3) VENDOR QUOTE		-		XID			10		
For 10 booths								X10	
10. 10 000 hs		$\dashv$		25,630		413,	210	138,840	
		_							
		-							
·									

ENG FORM 150

(ER 1110-345-730))

PREVIOUS EDITION MAY BE USED

\* U.S. GOVERNMENT PRINTING OFFICE . 1990 9—6101

NOTE: VENDOR ADVISES EQUIPMENT BELOW

CAN ALLOMODIATE & BOOTHS. THEREFORE

FACH BOOTH COSTS 24,000.00

#### Cameron & Barkley Company

The description of the control of th

Flexible Manufacturing Systoms 10200 Alton Box Rd., Rox 26879 Jacksonville, FL 32218 (904) 757-0211

#### CamBar

GEORGE FALLON
REYNOLD & SMITH & HILLS
4651 SALISBURY RD.
JACKSONVILLE F1, 32256

#### MODICON COMPACT 984 CONFIGURATION

1	1	CONTROLLER HARDWARE PC-0984-120 1.5K Compact-984 CPU	400.00	400.00
2	1	MISC ITEMS AS-MEEP-000 EEPROM Memory Card	_200.00	<del>-300.00</del>
3	1	1/O MODULES AS-BADU-205 +/-10V,+/-20mA analog input module	375.00	375.00
4	1	AS-BDAP-209 115 VAC Output Module	160.00	160.00
5	1	AS-BDAU-202 4-20 mA Analog Input	435.00	435.00
6	1	AS-BDEP-209 115 VAC Input Module	115.00	115.00
7	1	AS-P120-000 120 VAC - 24 VDC Power Converter	200.00	200.00
8	1	HOUSINGS AS-HDTA-200 primary subrack	165.00	165.00
9	1	AS-HDTA-201 secondary subrack - 5 module	165.00	165.00
10	1	CABLES AS-WBXT-201 Bus Extension Cable	70.00	70.00
		TOTAL AMOUNT:		<del>-2285.00</del>
NOTE:	ALL	MODICON EQUIPMENT COMES WITH A THREE YEA	AR WARRANTY.	\$2085.00

NOTE: ALL MODICON EQUIPMENT COMES WITH A THREE YEAR WARRANTY.
PLEASE REFER TO THIS QUOTATION NUMBER. #99-910515-P004

MARK J. WALKER SYSTEMS SPECIALIST

10-9

#### DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005 CHAMPAIGN, ILLINOIS 61826-9005

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